Service Manual

Color Video Camera

MODEL **WV-4850**

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Panasonic

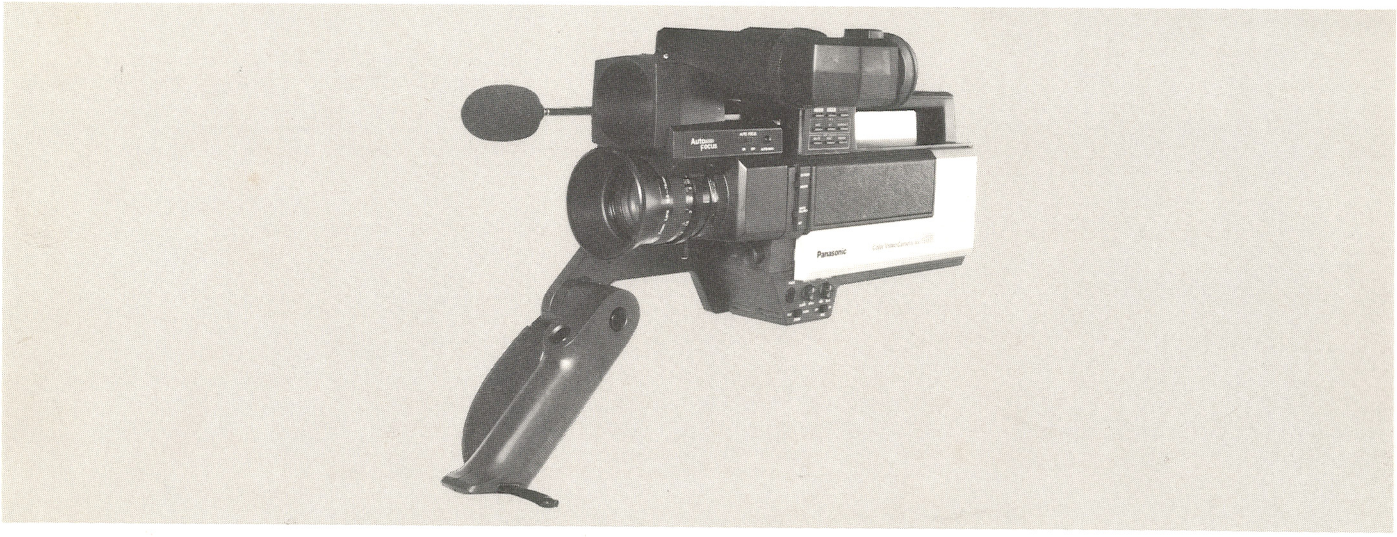
ORDER NO. VKD82070644C4

Service Manual

Vol. 1

Circuit Description

Color Video Camera
WV-4850



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Panasonic®

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1 Principle of Single Carrier Frequency Multiplexing System using a Single Tube

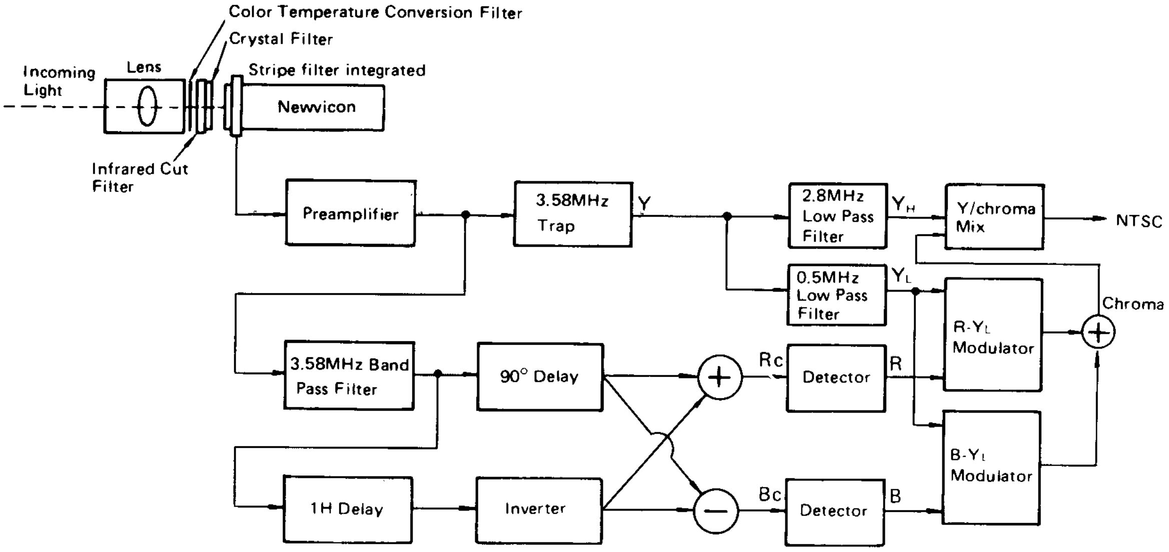

Color Temperature Conversion Filter
Crystal Filter
Stripe filter integrated
Incoming Light
Lens
Newvicon
Infrared Cut Filter
Preamplifier
3.58MHz Trap
Y
2.8MHz Low Pass Filter
Y_H
Y/chroma Mix
NTSC
0.5MHz Low Pass Filter
Y_L
Chroma
R-Y_L Modulator
3.58MHz Band Pass Filter
90° Delay
Rc
Detector
R
B-Y_L Modulator
1H Delay
Inverter
Bc
Detector
B

Fig.1-1 Principle of Single Carrier Frequency Multiplexing System using a Single Tube

The incoming light to the camera which passes through the automatic iris control(AIC) lens, the color temperature conversion filter, the infrared(IR) cut filter and the crystal filter reaches the surface of the integrated stripe filter in a 2/3" pick-up tube(S4131A).
The diffusion filter is inserted between the AIC lens and the color temperature conversion filter when the white balance switch is set to the SET position.

Color Temperature Conversion Filter

Generally, the human eye is sensitive to electromagnetic waves from 380mμ(mμ=nm) to 780mμ in wavelength-(the visible region). In addition, the human eye also discerns the wavelength difference as a color difference. The human eye responds to the light between 400mμ to 500mμ wavelength as predominantly blue information, the light between 500mμ to 600mμ as green information, and the light between 600mμ to 700mμ as red information. The entire light in the "visible" range of wavelength from 380mμ to 780mμ is seen as different amount of white light.

When a carbon is burned, it emits light of a different quality depending on how hot it is. Various natural light can be expressed in terms of a color temperature which may be referred to a light emitted from the burning carbon used as a standard. A light source of 3200°K (K=Kelvin: -273°C corresponds to 0°C an absolute temperature) color temperature, which is used in studios, implies that its quality (color) is the same as that emitted from the carbon burning at 3200°K(2927°C) The relationship between the color temperature of light sources used for illumination and weather conditions are shown in Fig. 1-4. The color temperature goes up as the weather turns overcast from clear. This may be related to the burning carbon(charcoal) as follows. When the charcoal is heated and begins to glow (at low temperature), it emits a reddish light. But when it is so-called white hot (at high temperature), a bluish light is emitted. In other words, the light at a low color temperature is considered reddish and at high color temperature is considered bluish.

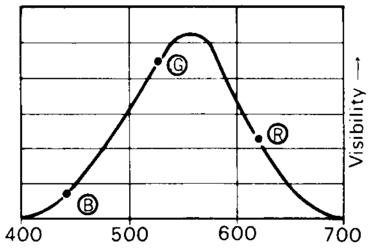


Fig. 1-2 Standard Luminosity Curve

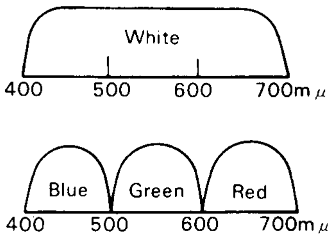

White
400
500
600
700mμ
Blue
Green
Red
400
500
600
700mμ

Fig. 1-3 The Visible Spectrum

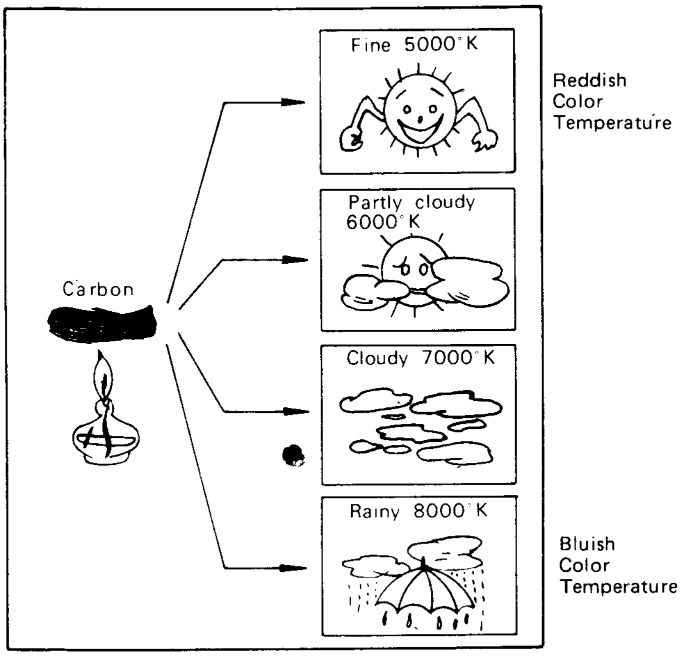


Fig. 1-4 Color Temperature and Weather Conditions

When a color camera is pointed at an object illuminated by a light of low color temperature, it reproduces a reddish picture.

When a color camera is pointed at an object illuminated by a light of high color temperature, it reproduces a bluish picture. The color camera has the indoor-outdoor selection switch which corrects for the color temperature of the light. When the switch is set to the outdoor position, the 5500°K COLOR TEMPERATURE CONVERSION FILTER is inserted into the light path to convert the color temperature from 5500°K to 3200°K In addition to the indoor-outdoor selection switch utilizing the color temperature conversion filter, this camera is designed so that the level of red and blue signals can be changed independently to meet the color temperature of the light source in order to ensure proper color reproduction.

Infrared Cut Filter

As shown in Fig. 1-5, the pick-up tube has some sensitivity in the infrared region beyond the visible range. The infrared(IR) cut filter cuts off the infrared light rays which the human eye does not see as light. If the color signal is made by using the video signal corresponding to the infrared rays which the human eye can not normally see, the color of pictures on the monitor and that seen with the naked eye would differ substantially.

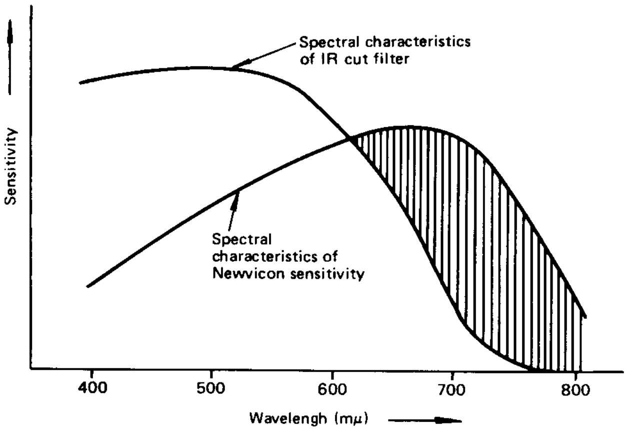


Fig. 1-5 IR Cut Filter Response

Crystal Filter

As described later, since the red and blue images are modulated by the fine stripe filter built into the pick-up tube , false signals could develop due to interference between the stripe filters and fine detail objects. The crystal filter is an optical low pass filter which prevents the occurrence of such false signals by blocking the high frequency components of images.

Diffusion Filter

When the white balance switch is set to SET position, the diffusion filter is inserted between the AIC lens and the color temperature conversion filter to diffuse the incoming light, and the whitish light reaches the pick-up tube.

Pick-up Tube

Different from that of the black and white camera, the pick-up tube used in this color camera has a built-in stripe filter, a metallic stripe called the optical black(OB) located on the face-plate. The video signal's black level is set in reference to the signal from the optical black.

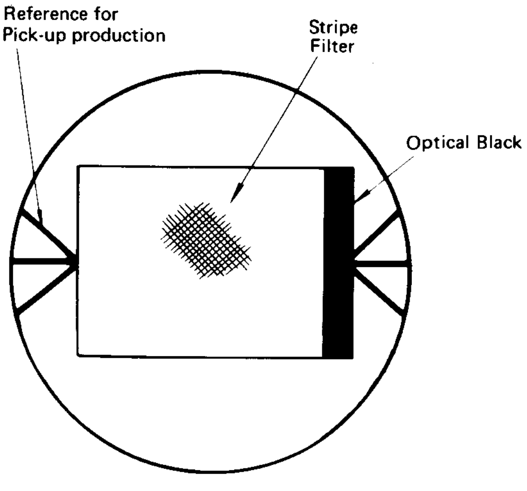


Fig. 1-6 Front View of S4131A Newvicon

As shown in Fig.1-9 Ⓑ , the stripe filter integrated into the pick-up tube consists of a cyan/transparent stripe filter section and a yellow/transparent stripe filter section. These stripe filters are so arranged as to be of the same pitch in the horizontal scanning direction, and have equal angles with respect to the vertical. The pick-up tubes even and odd scanning lines pass the tracks of the stripe filters that are arranged in the same way. In other words, the even and odd scanning lines are spaced "a" apart.

For easy understanding, let' assume that light of uniform level containing green(G), red(R), and blue(B) reaches the pick-up tube(Fig. 1-9 Ⓐ), and that the crosspoint of cyan and yellow stripe filter is scanned as shown in Fig. 1-9 Ⓑ .

Let's consider the light output from the stripe filter. The cyan filter cuts off the red(R) light which is complementary to it, and the yellow filter cuts off the blue(B) light which is complementary to it. (Fig. 1-7).

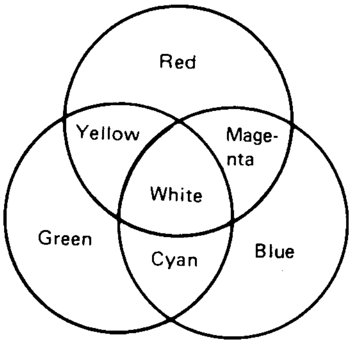


Fig. 1-7 Complementary Color

The light output Ⓒ , which corresponds to the Nth scanning line contains the modulated R and B components, riding on top of unmodulated G component. The light output Ⓓ , which corresponds to the N+1st scanning line contains the modulated R and B components, riding on top of the unmodulated G components. Light output Ⓔ , Ⓕ , and Ⓖ correspond to N+2nd, N+3rd and N+4th scanning lines respectively. The light Ⓒ for the Nth line and the light Ⓖ for the N+4th line are exactly same.

The stripe filters have the same pitch in the horizontal scanning direction, and the same angle in the vertical directions so that there is a phase difference of 90° among modulated components.

The pick-up tube produces the video signal whose waveform is the same as the that of the light which comes from the stripe filter.

The modulation frequency for the R and B signals can be calculated from the following equation.

$$f = \frac{w \times 10^3}{p \times t} \quad \text{(MHz)}$$

Here, f : Modulation frequency (MHz)
W : Horizontal width of effective scanning area of pick-up tube (mm)
p : Stripe filter pitch (μm)
t : Horizontal video signal duration (line duration (1H)-horizontal blanking duration (H.BL)) (μs)

Specially;

$W = 7.49$mm

$p = 40\ \mu$m

$t = 1H - H.BL = 63.5 - 11.2(11.7) = 52.3\ \mu s$

$$f = \frac{w \times 10^3}{p \times t} = \frac{7.49 \times 10^3}{40 \times 52.3} = 3.58\text{MHz}$$

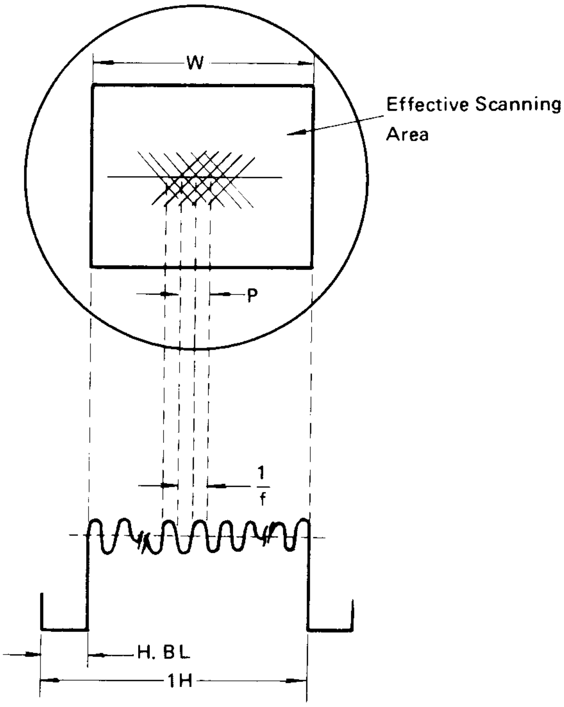


Fig. 1-8 Modulation Frequency

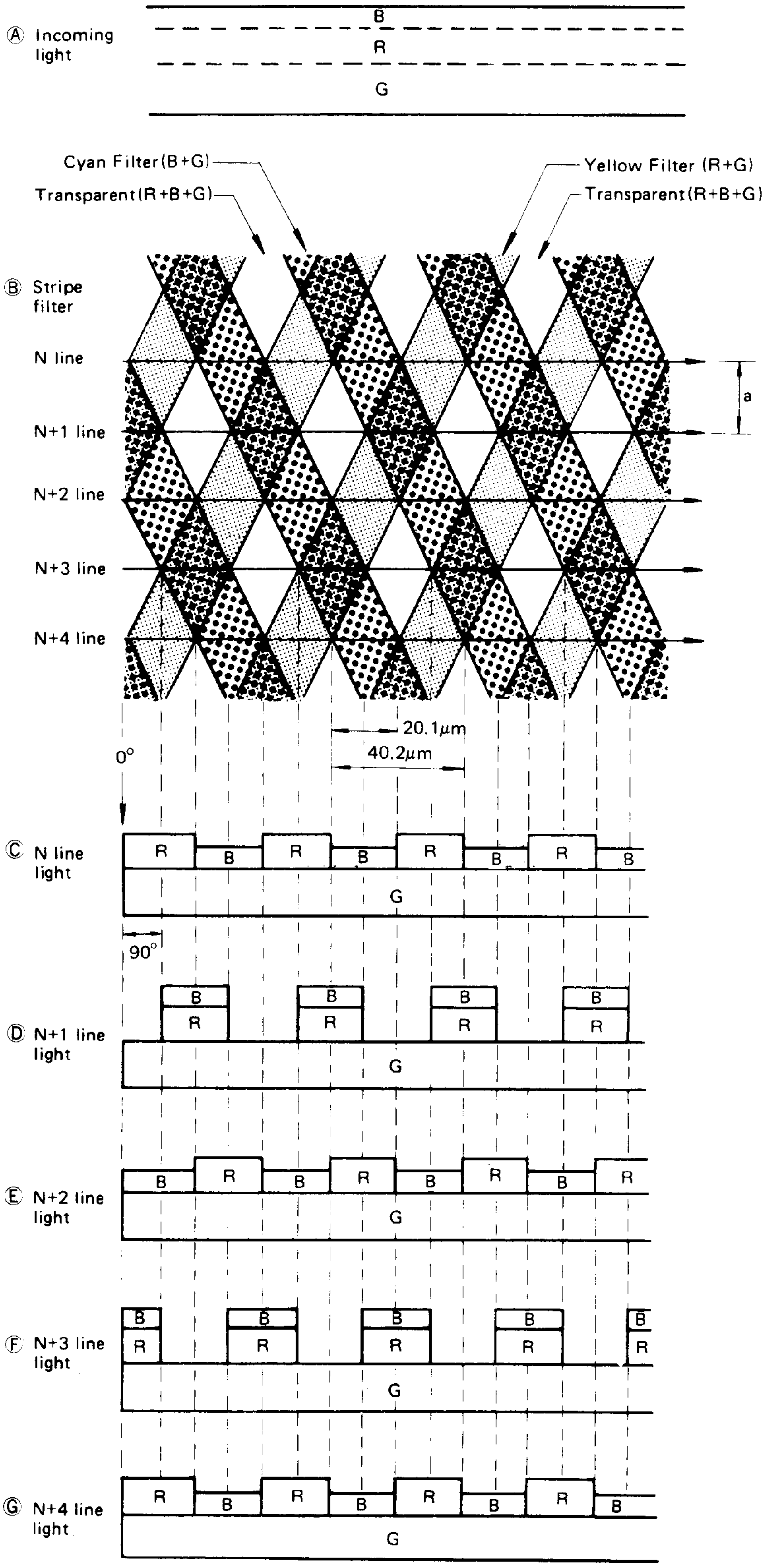

Ⓐ Incoming light
B
R
G
Cyan Filter(B+G)
Transparent(R+B+G)
Yellow Filter (R+G)
Transparent(R+B+G)
Ⓑ Stripe filter
N line
N+1 line
N+2 line
N+3 line
N+4 line
a
20.1μm
40.2μm
0°
90°
Ⓒ N line light
Ⓓ N+1 line light
Ⓔ N+2 line light
Ⓕ N+3 line light
Ⓖ N+4 line light
R
B
G

Fig. 1-9 Light from Stripe Filter

The incoming light is thus converted by the integrated stripe filter into a signal which contains R and B signals modulated by 3.58MHz, and the G signal.

This signal is sent to the preamplifier, where it is amplified. The amplified signal Ⓗ (see Fig. 1-11) from preamplifier is sent to the 3.58MHz trap circuit, which passes only the luminance(Y) signal Ⓘ comprising the G signal and the mean value of the modulated R and B signals. The mean value of modulated R and B signals on adjacent scanning lines are equal so that the luminance signal corresponding to two successive lines is also equal (see Fig. 1-10) due to the characteristics of the trap circuit.

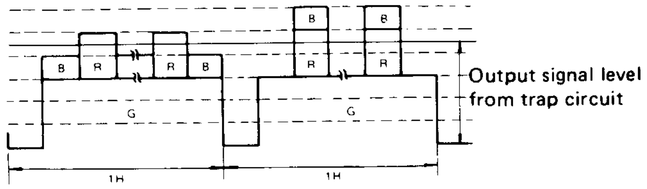

B
R
G
1H
Output signal level from trap circuit

Fig. 1-10 Detection of Y signal

The Y signal thus obtained is supplied to the 2.8MHz low pass filter and the 0.5MHz low pass filter. The luminance(YH) signal having high frequency response and the luminance signal (YL) having low frequency response come out from these low pass filters.

The YH signal is supplied to the Y/chroma mix circuit and the YL signal to the R-YL and B-YL modulator circuits.

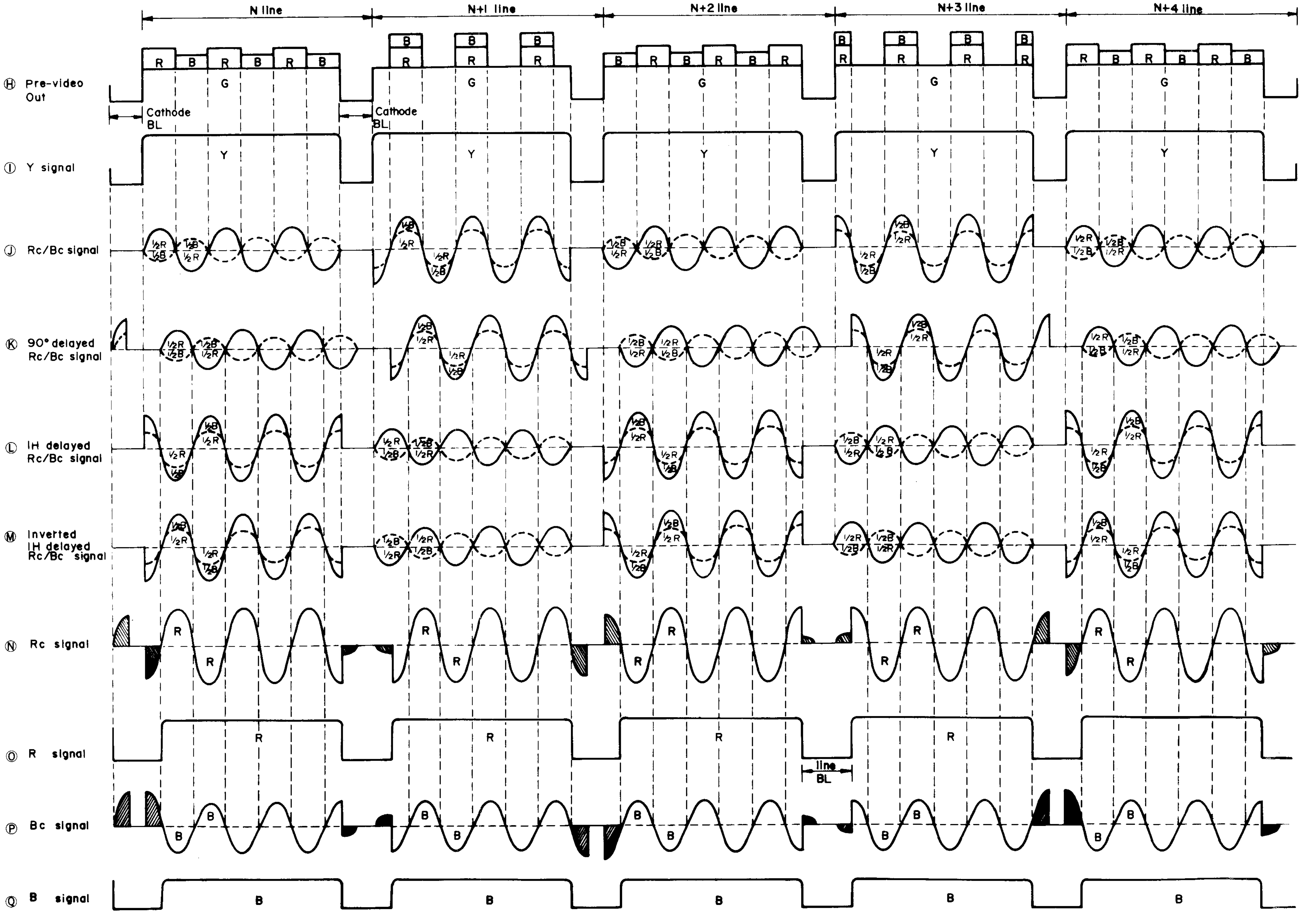
The amplified signal Ⓗ is also supplied to the band-pass-filter (B.P.F.) whose center frequency is 3.58MHz and through which only the 3.58MHz modulated signal Ⓙ passes.

The modulated signal Ⓙ is sent to the 90° phase shift circuit and the 1H(1 line) delay circuit, from which 90° phase shifted and 1H delayed modulated signals Ⓚ and Ⓛ are obtained.

The 1H-delayed modulated signal Ⓛ is inverted and the signal Ⓜ is obtained. The modulated R(Rc) signal Ⓝ is obtained by adding the modulated signals Ⓚ and Ⓜ, and the modulated B(Bc) signal Ⓟ is obtained by subtraction of the modulated signals Ⓚ and Ⓜ. The shaded portions on the signals Ⓝ and Ⓟ are removed by mixing the line blanking pulse.

The Rc and Bc signals obtained by addition and subtraction are supplied to detectors, from which R signal Ⓞ and B signal Ⓠ are obtained. The R signal and B signal thus obtained are fed to the R-YL and B-YL modulator circuits respsectively.

The chrominance signal obtained by mixing the R-YL and B-YL modulated signals is supplied to the Y/chroma mix circuit where it is mixed with the luminance(YH) signal to result in an NTSC signal.


N line
N+1 line
N+2 line
N+3 line
N+4 line
Ⓗ Pre-video Out
Cathode BL
R
B
G
Ⓘ Y signal
Y
Ⓙ Rc/Bc signal
½R
½B
Ⓚ 90° delayed Rc/Bc signal
Ⓛ 1H delayed Rc/Bc signal
Ⓜ Inverted 1H delayed Rc/Bc signal
Ⓝ Rc signal
Ⓞ R signal
line BL
Ⓟ Bc signal
Ⓠ B signal

*Shaded portions are removed by mixing the line blanking pulse.

Fig. 1-11 Detection of Y, R and B Signals

2 Preamplifier Circuit Board (YFVPKA0802JA)

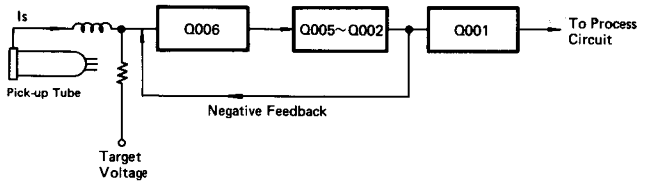
Outline

This circuit amplifies the signal current Is(0.2μA-0.3μA) from the pick-up tube.

The amplified video signal is delivered to the AGC & tracking signal generator circuit on the Process circuit board.

The preamplifier is a low output impedance and negative feedback amplifier which uses a low noise FET at the input.

To maintain the low noise in the signal, a so-called Percival circuit is used. It improves the S/N ratio at relatively high frequencies (where color components are located).



Is
Pick-up Tube
Q006
Q005~Q002
Q001
To Process Circuit
Negative Feedback
Target Voltage

Fig. 2-1 Preamplifier

Details

The signal current from the pick-up tube, comprising the modulated red(R) and blue(B) components, and the green(G) component, is supplied to the target terminal of the Preamplifier circuit and converted to the video signal by R017 through L002 Percival coil. This video signal is amplified approx. 30dB by the amplifier which consists of Q006 FET and Q005. The amplified signal is then fed to Q004, Q003 and Q002 which amplify the input signal approx. 66dB.

The signal at the collector of Q002 is negatively fed back to the gate of Q006 through a feedback circuit which consists of R014, R015, C006 and C007.

The CT001 adjusts the frequency response of the feedback signal and corrects the frequency response of video signal.

The video signal whose frequency response is shaped by the negative feedback is converted to the low impedance video signal with the use of buffer Q001. It is then supplied to the Process board (YFVPKC4850JA).

The target voltage for the pick-up tube is supplied from the Deflection board to terminal No. 1 (Target voltage in) of the multi-pin connector CN002 through the Process board.

The target voltage, controlled due to the pick-up tube temperature drift, is supplied to the pick-up tube target through R001, R018 and L002.

Percival Circuit

The pick-up tube's output is a low noise signal, so that the video S/N is determined by the noise of the preamplifier.

The S/N of the modulated R and B signal is lower than the S/N of the non-modulated signal in the low frequency range due to effects of the pick-up tube output capacitance and the input capacitance of the preamplifier.

Percival circuit is adopted to reduce the effects of these capaicitances and improve the S/N.

The beneficial effects of the Percival circuit are shown in Fig. 2-2. The equivalent circuit is also shown in Fig. 2-3.

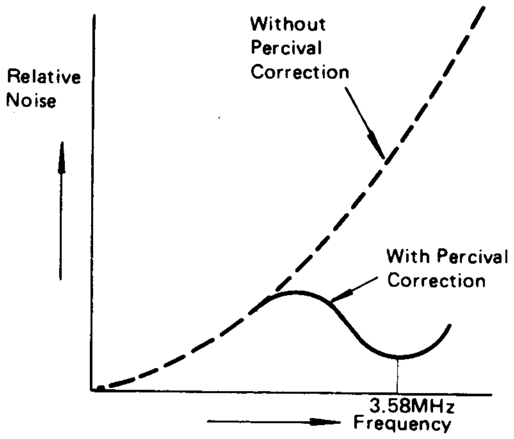


Fig. 2-2 Percival Correction

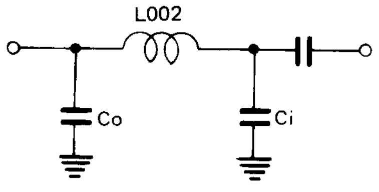
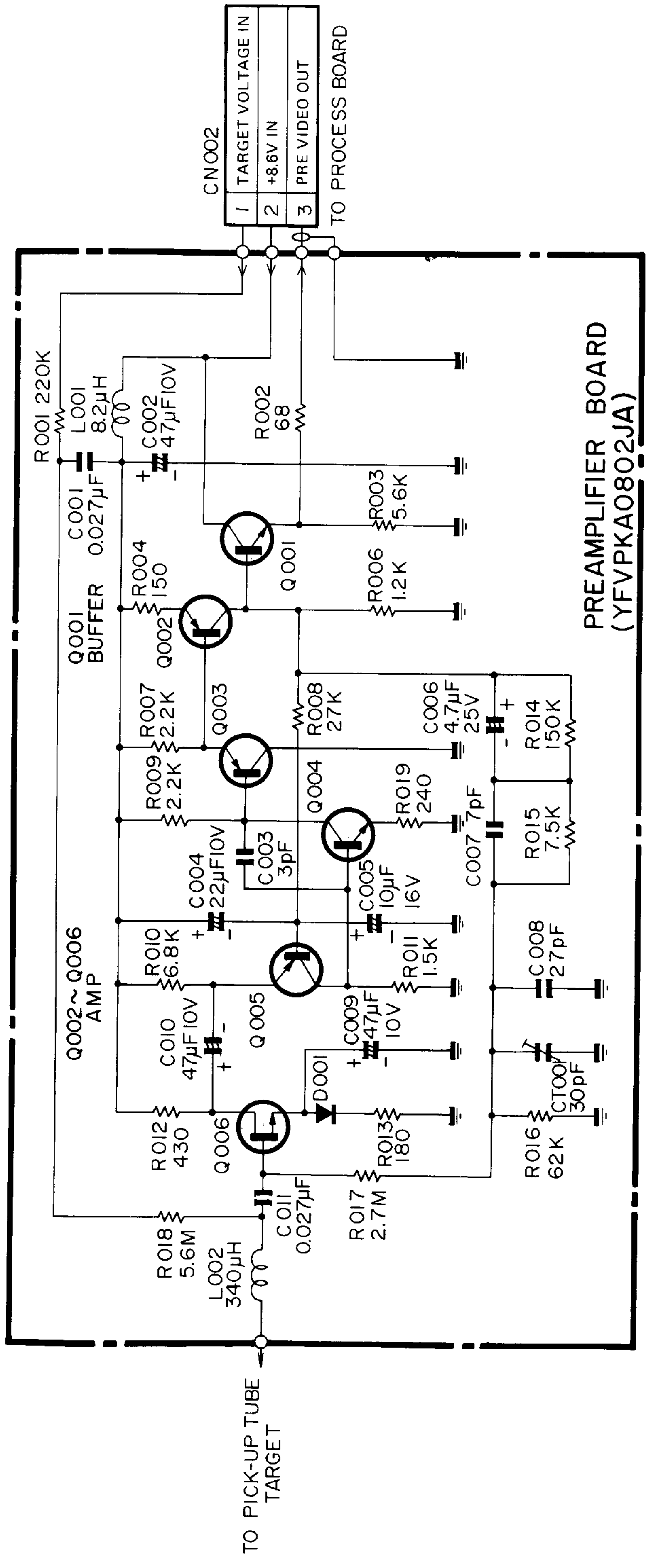


Fig. 2-3

Where : L002; Percival coil
Ci ; Input capacitance of pre-amp
Ci : Input capacitance of pre-amp



CN002
1 TARGET VOLTAGE IN
2 +8.6V IN
3 PRE VIDEO OUT
TO PROCESS BOARD
PREAMPLIFIER BOARD (YFVPKA0802JA)
R001 220K
L001 8.2μH
C002 47μF10V
C001 0.027μF
R002 68
R003 5.6K
Q001
R004 150
Q001 BUFFER
Q002
R006 1.2K
R007 2.2K
Q003
R008 27K
C006 4.7μF 25V
R014 150K
R009 2.2K
Q004
R019 240
C007 7pF
R015 7.5K
C004 22μF10V
C003 3pF
C005 10μF 16V
Q002~Q006 AMP
R010 6.8K
R011 1.5K
C008 27pF
C010 47μF10V
Q005
C009 47μF 10V
D001
CT001 30pF
R012 430
Q006
R013 180
R016 62K
C011 0.027μF
R017 2.7M
R018 5.6M
L002 340μH
TO PICK-UP TUBE TARGET

Fig. 2-4

3 Deflection Board (YFVPKB4850JA)

The Deflection Board contains following circuits.

page
3-1 +4.8V/+8.6V Regulator Circuit 8
3-2 +6V Regulator Circuit 10
3-3 Audio Amplifier Circuit 10
3-4 Zoom Control Circuit 11
3-5 Horizontal Deflection Circuit 11
3-6 Horizontal Linearity Correction Circuit 12
3-7 Vertical Deflection Circuit 13
3-8 Target Voltage Control Circuit 13
3-9 Cathode Blanking/Beam Detect Circuit 14
3-10 Bias Light Circuit 15
3-11 High Voltage Circuit 15
3-12 EVF Video Amplifier Circuit 16
3-13 EVF Vertical Deflection Circuit 16
3-14 EVF Horizontal Oscillation Circuit 17
3-15 Standby Circuit 17
3-16 Playback Control Circuit 18

3-1 4.8V/+8.6V Regulator Circuit

The +12V DC power from the portable VCR or the power supply is applied through terminal No. 10 of VCR connector CN110 and terminal No. 4 of CN010 to the emitter of Q002 and Q001 respectively.

+5V DC is generated inside IC001 and used as sub-power inside IC001.

55KHz triangular signal is also generated in triangle oscillator (OSC) inside IC001 and fed to the +4.8V regulator and +8.6V regulator circuits.

- **+4.8V Regulator**

In the +4.8V regulator, triangular signal Ⓐ supplied from triangle OSC inside IC001 and the DC voltage Ⓑ generated in +4.8V regulator whose level is set by VR001 (+4.8V/+8.6V ADJ) are compared and switching pulse Ⓒ whose width is controlled by the generated DC voltage is appears at pin 7 of IC001. This switching pulse is then applied to the base of switching transistor Q002 switching ON and OFF Q002.

As a result, the DC voltage whose level is set by the switching pulse width (pulse duty) is obtained at the output of switching regulator circuit consisting of Q002, D002 and L003. The generated DC voltage is fed back to +4.8V regulator through pin 5 of IC001 to maintain constant output voltage.

VR001 is adjusted for +4.8V.

The regulated +4.8V is then supplied to the each circuit boards as a power through the filters consisting of L003/C005 and L005/C014.

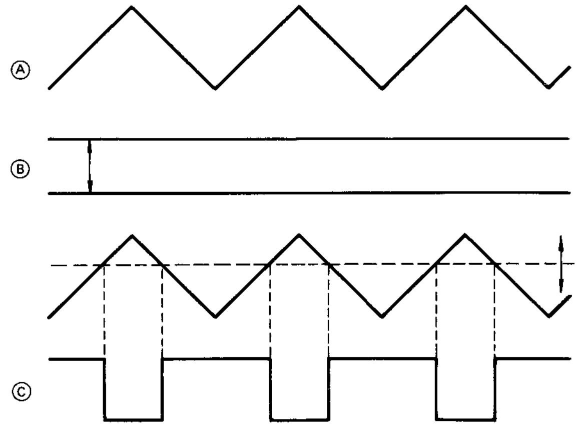


Fig. 3-1-1 +4.8V/+8.6V Regulator

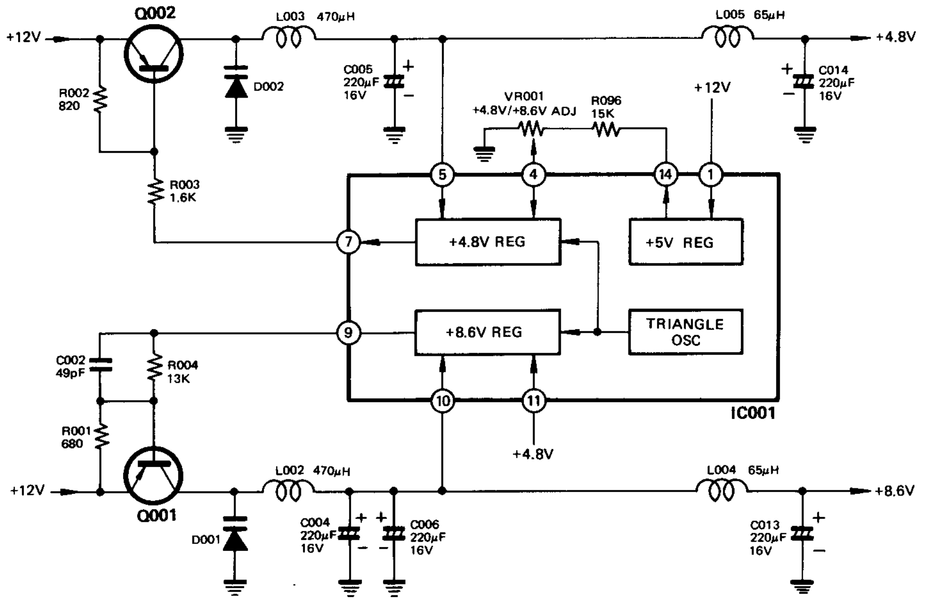

Q002
+12V
R002 820
L003 470μH
D002
C005 220μF 16V
L005 65μH
+4.8V
C014 220μF 16V
VR001 +4.8V/+8.6V ADJ
R096 15K
+12V
R003 1.6K
5
4
14
1
7
+4.8V REG
+5V REG
9
+8.6V REG
TRIANGLE OSC
10
11
IC001
C002 49pF
R004 13K
R001 680
+4.8V
+12V
Q001
L002 470μH
D001
C004 220μF 16V
C006 220μF 16V
L004 65μH
+8.6V
C013 220μF 16V

Fig. 3-1-2 +4.8V/+8.6V Regulator Circuit

- **+8.6V Regulator**

+8.6V DC is similarly generated as +4.8V regulator circuit.

The DC voltage whose level is set by the regulated +4.8V through pin 11 of IC001 is generated in +8.6V regulator inside IC001.

In the +8.6V regulator, triangular signal generated in triangle OSC inside IC001 and DC-voltage are compared and switching pulse is generated. This generated switching pulse is then applied to the base of switching transistor Q001 to control Q001 ON or OFF.

The resultant DC voltage whose level is set by the switching pulses duty is obtained at the output of switching regulator circuit consisting of Q001, fly wheel diode D001 and L002. The generated DC voltage is fed back to +8.6V regulator inside IC001 through pin 10 to maintain constant output.

The regulated +8.6V is supplied to the each circuit boards as a power through the filters consisting of L002/C004/C006 and L004/C013.

Protection Circuit

This circuit detect the currents flow from the +4.8V-/+8.6V regulator circuits.

Under normal condition, +8.6V is applied to pin 5 and pin 6 of comparator IC002(b) through R013 and L004-/R012 and potential at pin 7 of comparator output set to low(L).

+4.8V is supplied to pin 2 and pin 3 of another comparator IC002(a) through R007 and L005/R014/R009. However, low(L) potential at pin 7 of IC002(b) is fed to pin 2 of comparator IC002(a) through R008 and potential at pin 2 is lower than that of pin 3 thus comparator output at pin 1 is set to high(H).

When the high potential is supplied to protection circuit inside IC001 through pin 3, +4.8V/+8.6V are generated normally.

If over-current flows on +8.6V line, voltage drop appears at L004 due to the current and potential at pin 6 becomes lower to change comparator output at pin 7 from L to H.

This H potential is then fed to pin 2 of another comparator through R008 and higher the potential at pin 2 to change output potential at pin 1 from H to L.

When the potential at pin 3 of IC001 becomes L, protection circuit start to operate to stop generating the DC voltage at +4.8V/+8.6V regulators inside IC001 thus no +4.8V/+8.6V are generated.

If over-current flows on +4.8V line, voltage drop appears at L005 and potential at pin 3 becomes lower to change comparator output potential at pin 1 of IC002(a) from H to L.

This low(L) potential through R009 and pin 3 of IC001 is start operate protection circuit inside IC001 to stop generating +4.8V/+8.6V power.

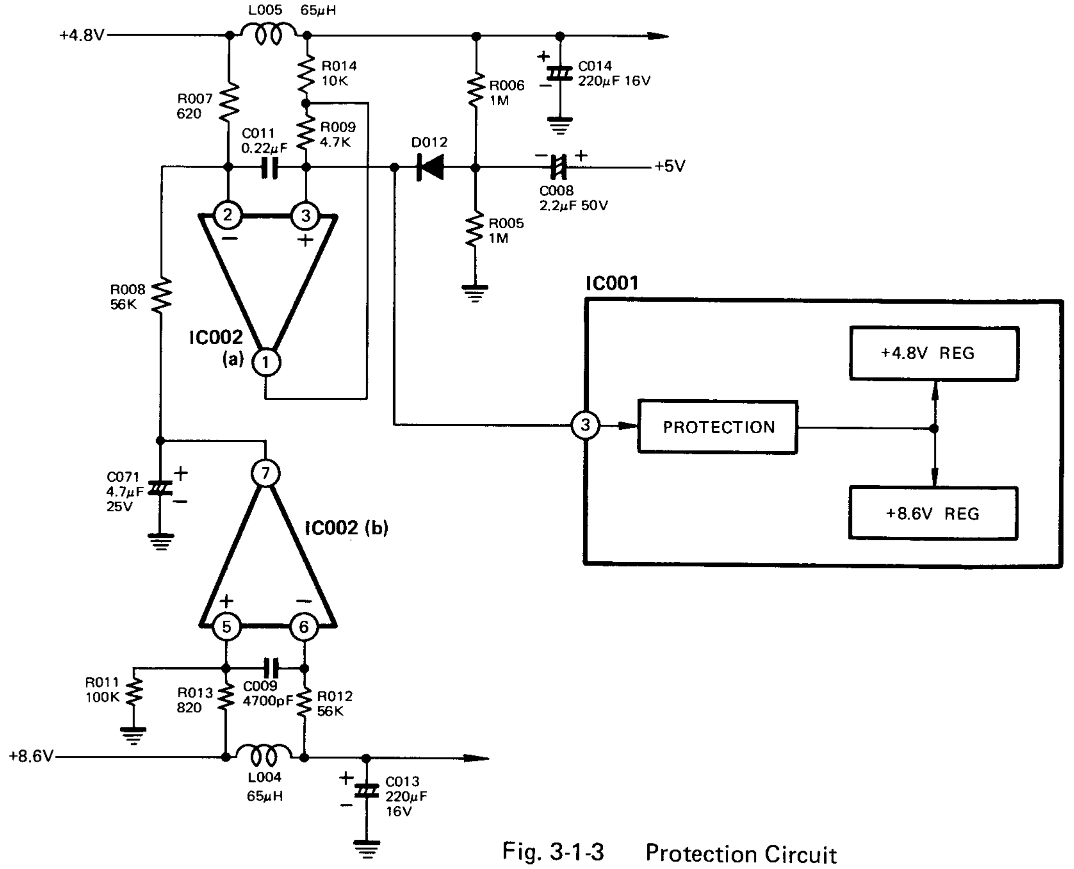

+4.8V
L005 65μH
R014 10K
R007 620
C011 0.22μF
R009 4.7K
R006 1M
C014 220μF 16V
D012
C008 2.2μF 50V
+5V
R005 1M
2
3
R008 56K
IC002 (a)
1
IC001
+4.8V REG
3
PROTECTION
+8.6V REG
C071 4.7μF 25V
7
IC002 (b)
5
6
R011 100K
R013 820
C009 4700pF
R012 56K
+8.6V
L004 65μH
C013 220μF 16V

Fig. 3-1-3 Protection Circuit

3-2 +6V Regulator Circuit

Outline

+6V DC is generated by regulating +8.6V generated in the +8.6V regulator circuit.
This +6V is used as sub-power supply for other circuits.

Details

The +6V DC is generated by regulating +8.6V DC power using IC003(a), Q016 and Q017.
The output voltage of Q016/Q017 is applied to pin 2 of IC003 to form a feedback loop, and thus stabilizing the voltage. The reference voltage is obtained by dividing the +8.6V using R067 and R068.

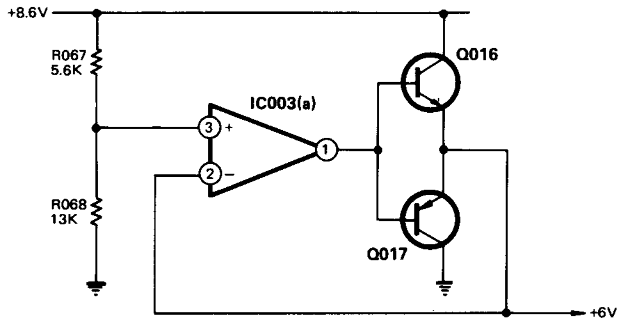

+8.6V
R067
5.6K
IC003(a)
Q016
R068
13K
Q017
+6V

Fig. 3-2 +6V Regulator Circuit

3-3 Audio Amplifier Circuit

Outline

This circuit amplifies the output from the mounted boom microphone or external microphone.
The amplified audio signal is sent out to the VCR for recording and to the earphone jack on the rear of the camera for audio monitoring.

Details

The -72dB output from the electret condenser microphone (which is mounted on the camera), or an external microphone is supplied to audio amplifier consisting of Q007 and IC003(b), where it is amplified +52dB. The -20dB audio output at pin 7 of IC003 is sent directly to the portable VCR or via power supply to the table model VCR through terminal No. 2 of CN010 and terminal No. 7 of VCR connector CN110, and earphone jack CN107 through terminal No. 2 of CN007.
The amplified audio signal at pin 7 of IC003 is also fed to D003 and peak-rectifier consisting of Q010, R036, R038 and C026 where it is converted into DC voltages. The rectified DC voltages are supplied to the base of Q009 to control the resistance between the collector and emitter of Q009.
When the audio signal level at pin 7 of IC003 increases, the DC voltage at the base of Q009 also increases and resistance between collector and emitter decreases. Therefore, the audio signal level at pin 5 of IC003 decreases.
When the audio signal level at pin 7 of IC003 decreases, reverse operation takes place.
In this way, the audio signal output level is kept constant.
The audio signal level is also controlled by the fade control signal supplied from Process board through Q011.

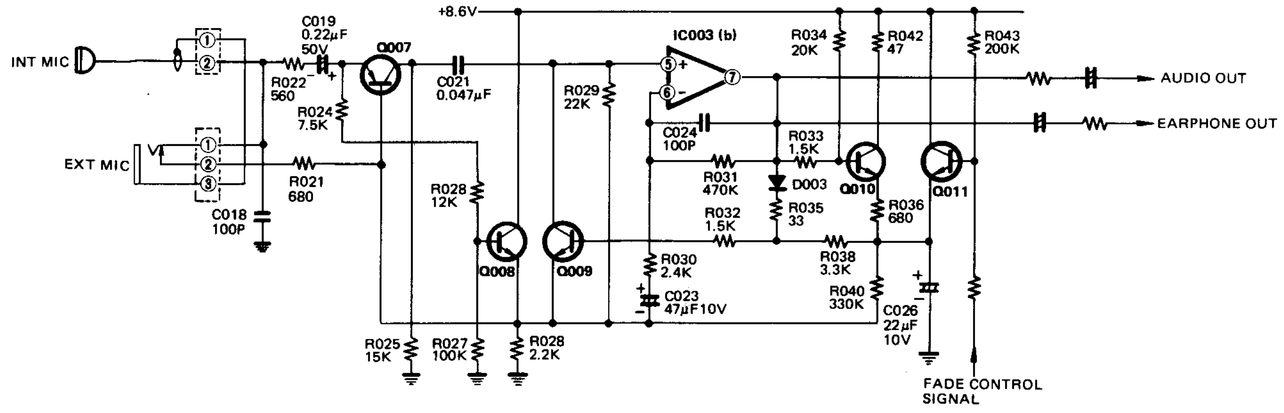

INT MIC
EXT MIC
C019
0.22μF
50V
Q007
R022
560
R024
7.5K
R021
680
C018
100P
+8.6V
C021
0.047μF
R029
22K
R028
12K
IC003 (b)
C024
100P
R031
470K
R032
1.5K
R033
1.5K
D003
R035
33
Q010
Q011
R034
20K
R042
47
R043
200K
R036
680
R038
3.3K
R040
330K
C026
22μF
10V
R030
2.4K
C023
47μF10V
Q008
Q009
R025
15K
R027
100K
R028
2.2K
AUDIO OUT
EARPHONE OUT
FADE CONTROL
SIGNAL

Fig. 3-3 Audio Amplifier Circuit

3-4 Zoom Control Circuit

Outline

This circuit drives zoom lens motor.

Details

When the TELE switch SW102 on the handle grip is depressed, the base of Q004 shorted to the ground and turn ON Q004 and Q005. Therefore, the current flows into the zoom motor through Q005 and Q004 for zoom-in (telephoto) operation.
When the WIDE switch SW101 is depressed, Q006 and Q003 turn ON. Therefore, the current flows into the zoom motor (in the reverse direction) through Q003 and Q006 for zoom-out (wide angle) operation.
SW002 on the IRIS/COLOR Adjust board is a zoom speed switch to set the zoom speed by changing the DC voltage at the base of Q004 and Q006.

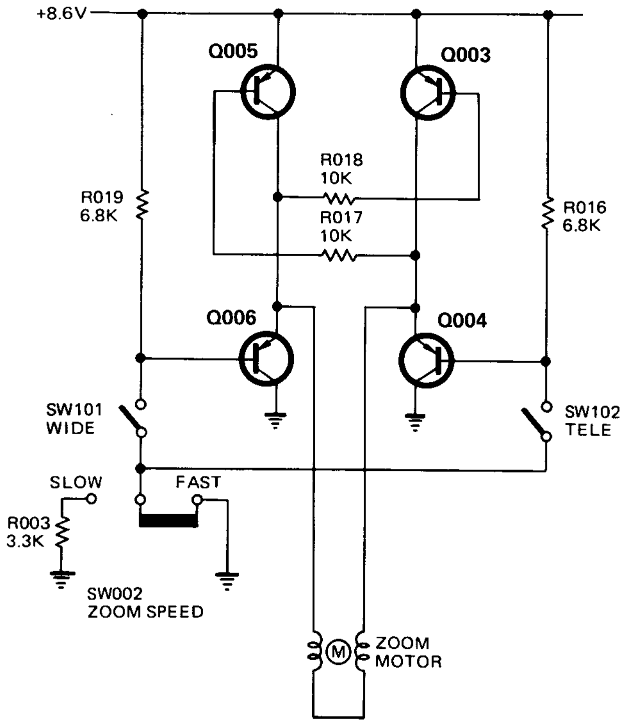

+8.6V
Q005
Q003
R018
10K
R017
10K
R019
6.8K
R016
6.8K
Q006
Q004
SW101
WIDE
SW102
TELE
SLOW
FAST
R003
3.3K
SW002
ZOOM SPEED
ZOOM
MOTOR

Fig. 3-4 Zoom Control Circuit

3-5 Horizontal Deflection Circuit

Outline

This circuit generates the sawtooth current for the horizontal(H) beam deflection inside the pick-up tube, supplying it to the pick-up tube H. deflection coil.

Details

The horizontal scanning start(Hs) pulse supplied from the Process board (YFVPCK4850JA) goes via inverter Q013 to horizontal deflection output Q014. When Q014 is switched on by the Hs pulse from Q013, the collector current pulse at Q014 resonates with L006 and C033, and the resultant horizontal sawtooth current is generated and supplied to the pick-up tube horizontal deflection coil through terminal No. 4 of CN004. VR002 (H. SIZE) is a control for adjusting the horizontal scanning size.

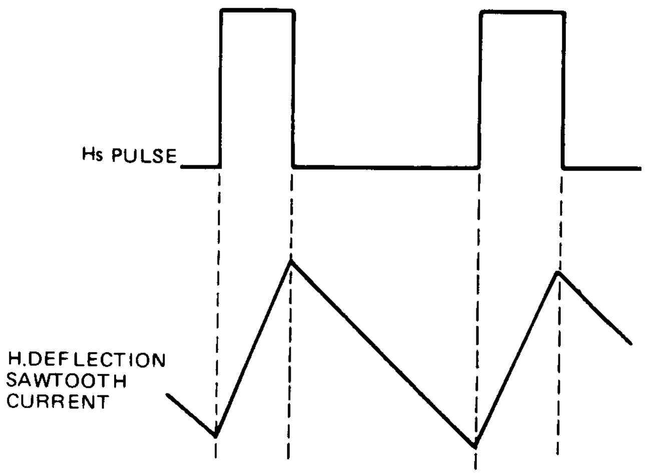


Fig. 3-5-1 Horizontal Deflection

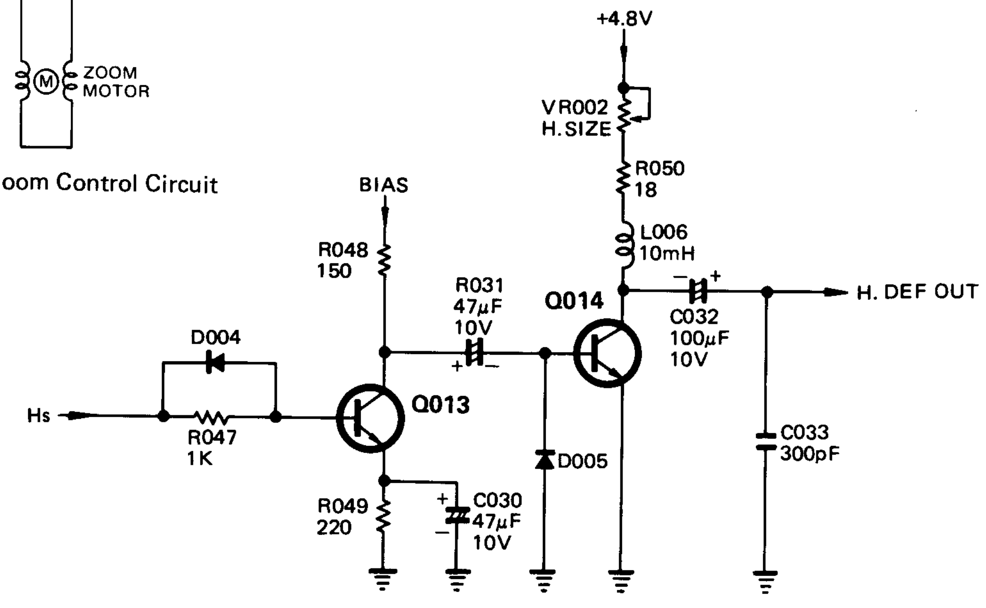

+4.8V
VR002
H.SIZE
R050
18
L006
10mH
BIAS
R048
150
R031
47μF
10V
Q014
C032
100μF
10V
H. DEF OUT
D004
Hs
R047
1K
Q013
D005
C033
300pF
R049
220
C030
47μF
10V

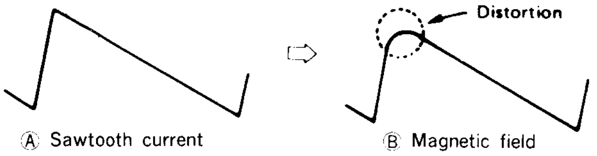
Fig. 3-5-2 Horizontal Deflection Circuit

3-6 Horizontal Linearity Correction Circuit

Outline

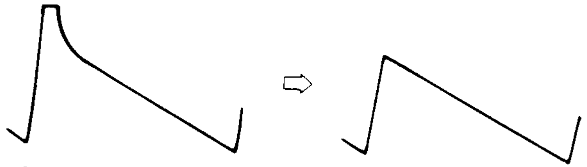
The horizontal (H) deflection circuit is of a switching type, so that the generated sawtooth current waveform has poor linearity. By feeding the sawtooth current to the deflection coil, the intensity of the magnetic field generated in the deflection coil is not linear as the pick-up tube's electron beam is deflected. If a linear sawtooth current Ⓐ is sent to the deflection coil, however, the magnetic field in the scanning start portion is distorted Ⓑ due to the effect of the pick-up tube's electrodes, coil hysterisis, etc. As a result, the linearity of the scanning start portion deteriorates, and a shading (unevenness of amplitude) appears on the left edge of the picture.

Therefore, in order to generate a linear magnetic field intensity Ⓓ and to correct the linearity and shading of the scanning start portion, it is necessary to feed a nonlinear sawtooth signal Ⓒ to the deflection coil.



Ⓐ Sawtooth current

Ⓑ Magnetic field



Ⓒ Corrected sawtooth current

Ⓓ Corrected Magnetic field

Fig. 3-6-1 Horizontal Linearity Correction-1

This circuit generates a waveform to "correct" the linearity of horizontal sawtooth current waveform and its starting portion. As shown in Fig. 3-6-2, the horizontal deflection circuit is connected to one end of the horizontal deflection coil, and the horizontal linearity correction circuit to the other end.

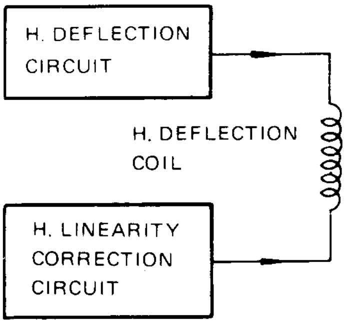


Fig. 3-6-2 Horizontal Linearity Correction-2

Details

The horizontal(H) flyback pulse Ⓔ produced from the collector of Q014 in the H. deflection circuit is integrated by L007 and R055 into a sawtooth signal Ⓕ

This sawtooth signal is again integrated by L007, R053 and C035 into a parabola signal Ⓖ, which is applied through R054 to pin 2 of differential amplifier IC004 (a) as a H. linearity correction signal.

The H. flyback pulse Ⓔ from Q014 is integrated by R56 and C036 into a linearity correction signal Ⓗ for correcting the linearity of the starting portion of the horizontal sawtooth current waveform. The starting portion linearity correction signal Ⓗ is applied to pin 3 of IC004 where the linearity correction signal Ⓖ and the starting portion linearity correction signal Ⓗ are mixed and amplified.

The mixed signal Ⓘ of these linearity correction signals at pin 1 of IC004 is fed to the H. deflection coil to correct the linearity of the horizontal sawtooth current waveform. L007 (H. LIN-1) is a control for adjusting the overall linearity of sawtooth current and VR003 (H. LIN-2) for adjusting the linearity of the starting portion. VR004 (H. CENTERING) is a centering control which controls the negative input potential of IC004 to change the direct current flowing to the H. deflection coil, and thus sets the horizontal scanning position on the pick-up tube.

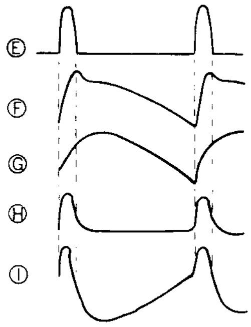


Fig. 3-6-3 Horizontal Linearity Correction-3

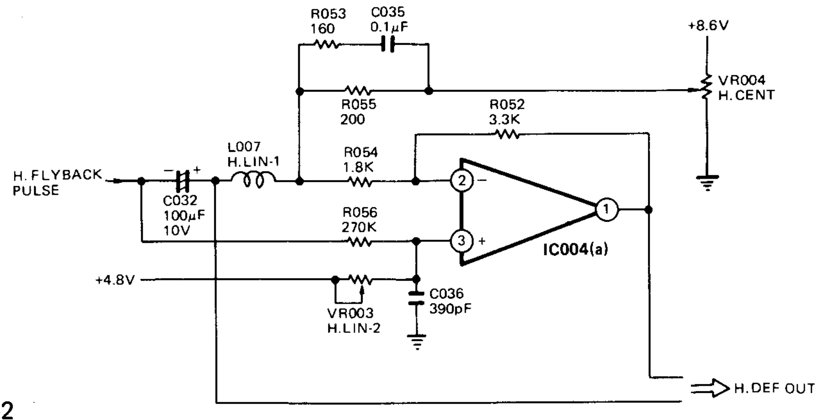


Fig. 3-6-4 Horizontal Linearity Correction Circuit

3-7 Vertical Deflection Circuit

Outline

This circuit generates a sawtooth current for the vertical-(V) beam deflection inside the pick-up tube, feeding it to the pick-up tube V. deflection coil.

Details

The vertical scanning start(Vs) pulse sent from the Process board (YFVPKC4850JA) is fed to sawtooth generator Q015 which converts it into a vertical rate sawtooth.

This sawtooth signal is applied to pin 6 of amplifier IC004, which produces an amplified vertical sawtooth signal from its output pin 7. This amplified signal is sent to the pick-up tube vertical deflection coil. The sawtooth current flowing to the vertical deflection coil is detected by R065 which is connected in series with the deflection coil, and fed back to sawtooth generator Q015, thus correcting the linearity of the vertical sawtooth waveform. Therefore, a linear sawtooth current flows into the pick-up tube vertical deflection coil.

VR005 (V.SIZE) is the control for changing the amplitude of the vertical deflection sawtooth waveform to set vertical scanning size. VR006 (V. CENTERING) is a centering control which controls the direct current flowing to the vertical deflection coil to set the vertical scanning position on the pick-up tube.

3-8 Target Voltage Control Circuit

Outline

Each pick-up tube has optimum target voltage to produce the best performance. The optimum target voltage for the Newvicon varies according to the Newvicon temperature.

The target voltage control circuit detects the Newvicon's temperature variation, and controls the target voltage according to the temperature drift to meet the optimum target voltage.

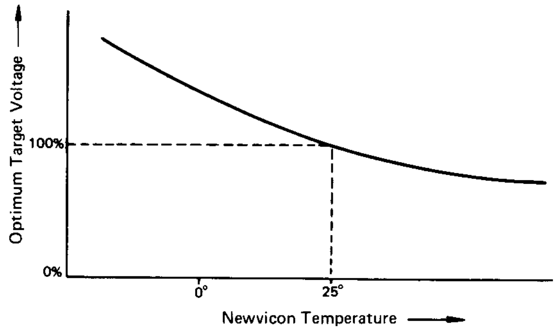


Fig. 3-8-1 Optimum Target Voltage of Newvicon

Details

The deflection coil assembly has a built-in temperature detecting thermistor which is connected between terminal No. 3 of CN004 and ground.

When the inside temperature of the deflection coil assembly changes (it also changes in the Newvicon) the thermistor resistance changes, causing the collector current of DC amplifier Q022 to change which in turn changes the collector voltage.

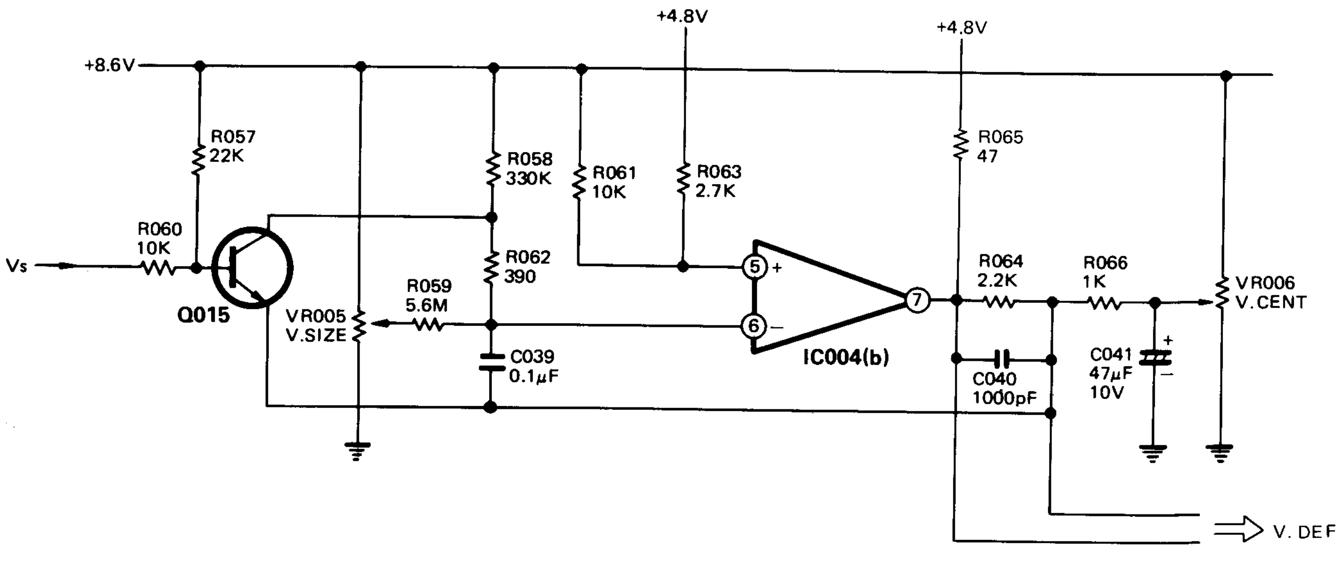


Fig. 3-7 Vertical Deflection Circuit

The target voltage applied to the Newvicon is set by VR007 (TARGET). If the temperature goes up, the resistance of the thermistor decreases so that the total resistance connected between the collector of Q022 and ground decreases.
Accordingly, the collector potential of Q022 falls, and the target voltage which is set by VR007 is reduced. In this way, the target voltage is kept optimum according to temperature variations. When the temperature falls, the reverse operation takes place.

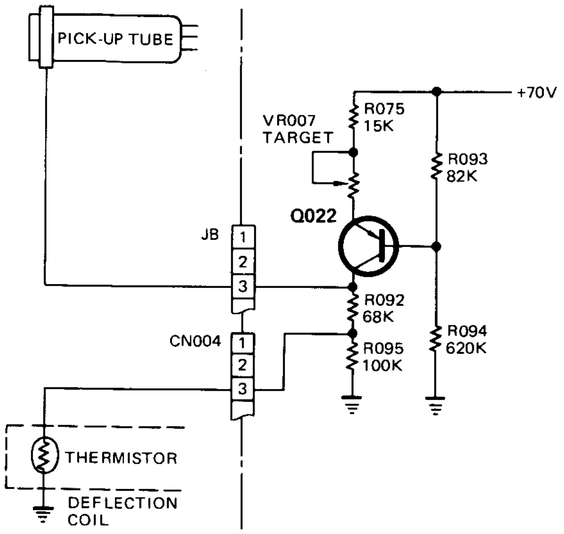


Fig. 3-8-2 Target Voltage Control Circuit

3-9 Cathode Blanking/Beam Detect Circuit

Cathode Blanking Circuit

Outline

This circuit generates a cathode blanking pulse and supplies it to the pick-up tube cathode(K) in order to eliminate the retrace scanning lines.

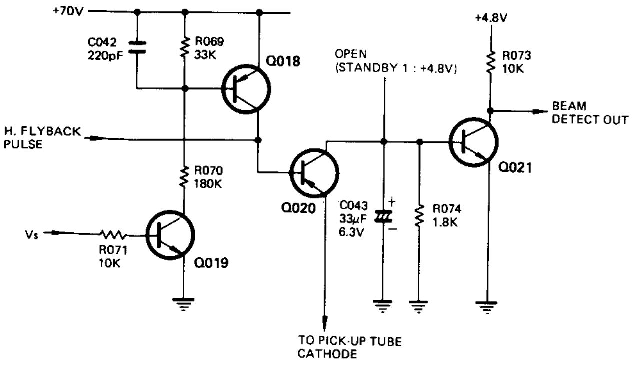


Fig. 3-9 Cathode Blanking/Beam Detect Circuit

Details

The horizontal(H) flyback pulse at the collector of H.deflection output Q014 and the vertical scanning start (Vs) pulse from the Process board through flat cable JC, inverter Q019 and Q018 are supplied to base of the switching amplifier Q020 respectively.
The mixed signal obtained at the emitter of Q020 is supplied to the cathode(K) of pick-up tube through terminal No. 4 of BI004 as a cathode blanking pulse.

Beam Detect Circuit

Outline

This circuit detect the current flow from the pick-up tube cathode (K) and generate the control signal. This control signal is then fed to the Micro processor board to control the automatic iris control (AIC) lens and automatic white balance control (AWC) circuit.

Details

When the power switch is initially turned ON, it takes some times for cathode of the pick-up tube to be heated sufficiently in order to emit electrons at full force. Therefore during initial period of the time after turn on the power switch, no current flow from the cathode (K) of the pick-up tube to Q020 and no DC bias apply to the base of Q021 thus Q021 stays off and potential at the collector of Q021 stays high(H).
This high potential at the collector of Q021 is fed through flat cable JA to the Micro processor board to set the automatic iris control (AIC) lens to close iris position in order to protect the pick-up tube from the burning. (Refer to Automatic Iris Control circuit in Micro processor board.)
Also this high potential supplied through the Micro processor board reset the automatic white balance control (AWC) circuit in Process board. (Refer to Auto White Balance Control circuit in Process board.)
After the pick-up tube warm up, current flows from the cathode normally then DC bias obtained at the base of Q021 to turn Q021 ON and potential at the collector of Q021 becomes low (L).
This low potential is supplied to the Micro processor board to operate AIC lens and AWC circuit normally.

3-10 Bias Light Circuit

Outline

The pick-up tube produces dark current when the light is blocked by capping the lens for example.

The dark current of Newvicon is extremely small comparing with vidicon. Therefore, when the camera is aimed at the dark scene, potential at the photoconductive(target) layer of Newvicon becomes lower than that of vidicon and the electron beam becomes insufficient to discharge the target. As a result, the beam does not respond to the variation of incoming light intensity to the Newvicon and lag increases. (When a moving object is shot, or when the camera is panned, a trailing image is exhibited. This trailing image is called lag.) In order to minimize the lag, bias light LEDs are positioned at the rear portion of pick-up tube for increasing the light intensity of the Newvicon.

Details

The DC current adjusted by VR010(BIAS LIGHT) flows into bias light LEDs in the bias light assembly through Q025 and pin 1 of CN008 to light them in order to keep the light intensity of the pick-up tube at certain level.

VR010 adjusts the brightness of LEDs.

3-11 High Voltage Circuit

Outline

This circuit generates high voltages needed for the pick-up tube.

Details

The pre-blanking(PRE BL) pulse generated in the Process board is supplied to the primary winding of step-up transformer in high voltage pack T001 through flat cable JC, inverter Q023 and driver Q024 to step up the PRE-BL pulse to necessary level.

The boosted pulses obtained at the secondary winding of step-up transformer are rectified to generate high voltages.

The high voltages are derived as follows.

The -70V obtained at pin 2 of T001 and rectified by D010 is fed to grid-1(G1) through VR011(BEAM). The +340V at pin 9 of T001 and rectified by D008 is applied to grid-2(G2) directly. +1.5kV obtained at pin 10 of T001 is supplied to grid-6(G6). The voltages for grid-4-(G4) and grid-5(G5) are obtained by dividing +1.5kV by block resistor Z001 and VR015(FOCUS) in Z001. The +70V obtained at pin 5 of T001 and rectified by D009 is fed to cathode blanking circuit and target voltage control circuit.

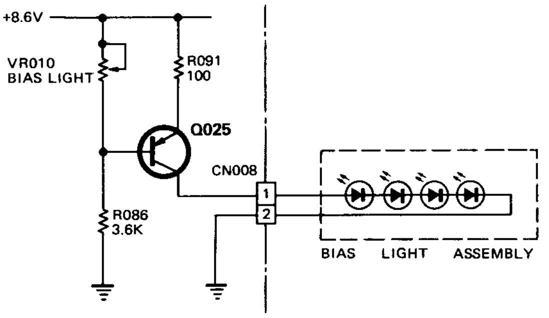

+8.6V
VR010
BIAS LIGHT
R091
100
Q025
CN008
1
2
R086
3.6K
BIAS LIGHT ASSEMBLY

Fig. 3-10 Bias Light Circuit

+8.6V
+70V

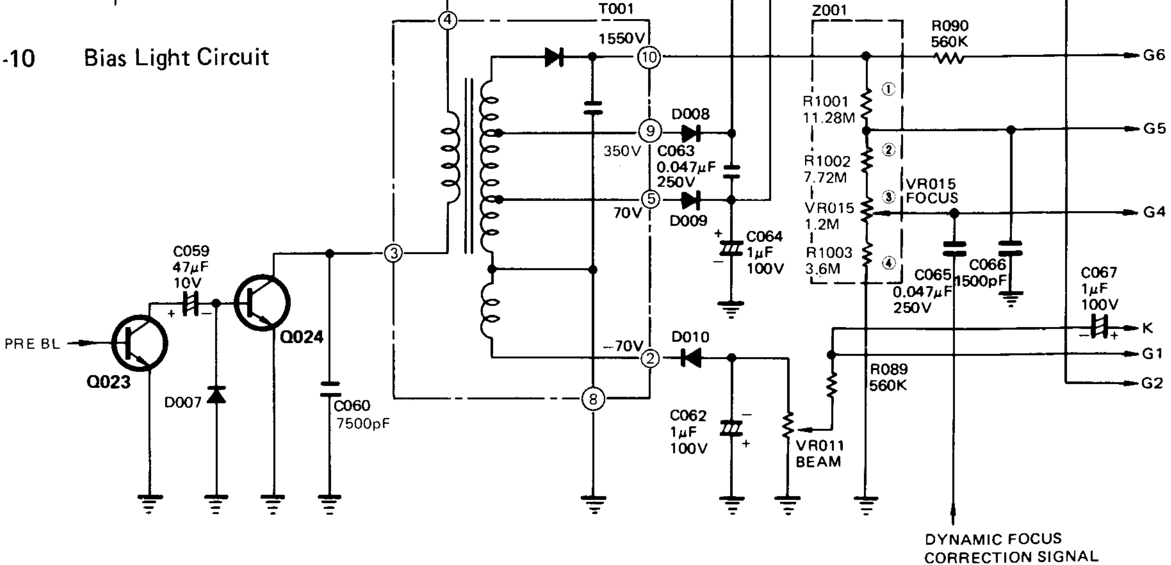

T001
1550V
⑩
D008
⑨
350V
C063
0.047μF
250V
⑤
D009
70V
C064
1μF
100V
④
③
C059
47μF
10V
PRE BL
Q023
Q024
D007
C060
7500pF
-70V
②
D010
⑧
C062
1μF
100V
VR011
BEAM
Z001
R1001
11.28M
①
R1002
7.72M
②
VR015
FOCUS
VR015
1.2M
③
R1003
3.6M
④
R090
560K
C065
0.047μF
250V
C066
1500pF
C067
1μF
100V
R089
560K
G6
G5
G4
K
G1
G2
DYNAMIC FOCUS
CORRECTION SIGNAL

Fig. 3-11 High Voltage Circuit

3-12 EVF Video Amplifier Circuit

Outline

This circuit amplifies the video signal supplied from the Process board and fed it to the cathode ray tube(CRT) together with the level indicator signal which indicates the video level and character signal which generated in the Microprocessor board for graphics display on the CRT screen.

Details

The NTSC signal from the Process board is applied to pin 18 of IC005 through trap CF004 which located on the Process board for removing the chrominance components in the NTSC signal and flat cable JC. The video signal is clamped and amplified at inside IC005 then mixed with level indicator signal and character signal. The mixed signal obtained at pin 24 of IC005 is supplied to grid-1(G1) of the CRT through buffer Q001 on the EVF connector board, VR002(CONTRAST) and amplifier Q002 in the Viewfinder board.

3-13 EVF Vertical Deflection Circuit

Outline

This circuit generates vertical deflection sawtooth current for vertical scanning of beam inside the cathode ray tube(CRT).

Details

The video signal from the Process board is supplied to the sync separator in IC005 through flat cable JC and pin 18 of IC005.

The sync separator in IC005 detects only sync pulse of video signal and V. sync pulse and H. sync pulse are made.

The vertical(V) sync pulse generated in the sync separation circuit is fed to V. oscillator (V.OSC) inside IC005 as a trigger pulse. the V. OSC is a free-running sawtooth generator whose frequency is approximately 50Hz. When the trigger pulse is supplied to the V.OSC circuit, it generates a 60Hz sawtooth signal.

The V. sawtooth signal obtained at pin 7 is fed to amplifier through pin 6 of IC005, where it is amplified. The amplified V. sawtooth signal at pin 5 of IC005 is fed to the CRT V. deflection coil through terminal No. 4 of CN004.

VR008 (EVF V.SIZE) is a control for vertical scanning size.

The V. sync pulse obtained at pin 13 of IC005 is supplied to Microprocessor board through flat cable JA.

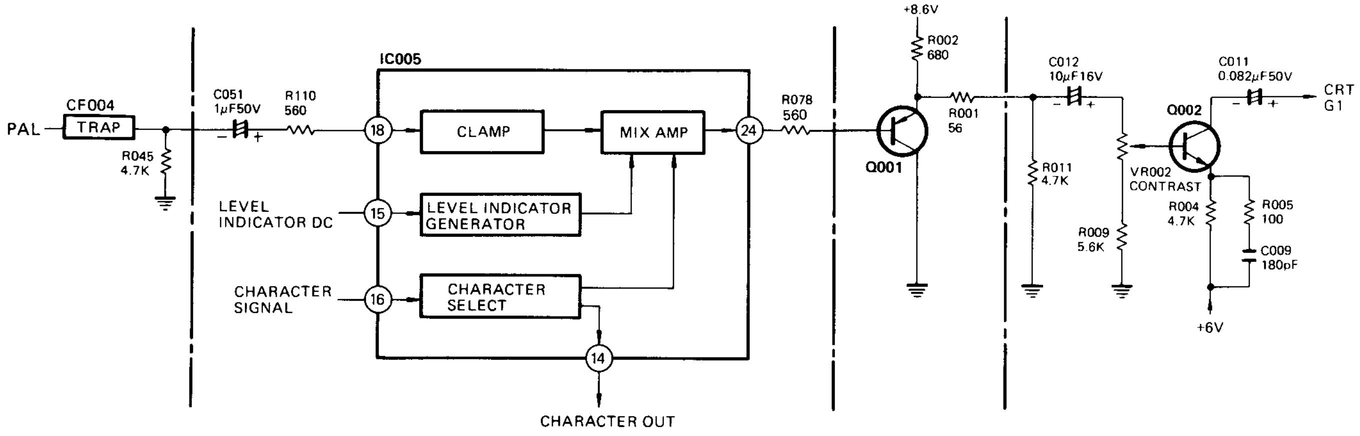

PAL
CF004
TRAP
R045
4.7K
C051
1μF50V
R110
560
IC005
18
CLAMP
MIX AMP
24
LEVEL INDICATOR DC
15
LEVEL INDICATOR GENERATOR
CHARACTER SIGNAL
16
CHARACTER SELECT
14
CHARACTER OUT
R078
560
+8.6V
R002
680
R001
56
Q001
C012
10μF16V
R011
4.7K
R009
5.6K
VR002
CONTRAST
Q002
C011
0.082μF50V
CRT
G1
R004
4.7K
R005
100
C009
180pF
+6V

Fig. 3-12 EVF Video Amplifier Circuit

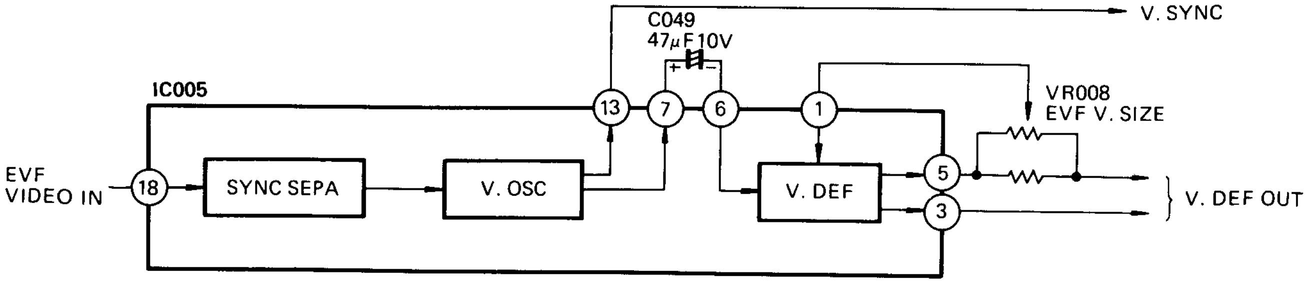

C049
47μF10V
V. SYNC
IC005
13
7
6
1
VR008
EVF V. SIZE
EVF
VIDEO IN
18
SYNC SEPA
V. OSC
V. DEF
5
3
V. DEF OUT

Fig. 3-13 EVF V. Deflection Circuit

3-14 EVF H. Oscillation Circuit

Outline

This circuit controls the frequency (phase) of the horizontal sawtooth current to correspond to that of horizontal(H) sync pulse separated from video signal.

Details

The horizontal(H) sync pulse from the sync separator is applied to phase comparator inside IC005. The H. oscillation signal from the H. oscillator (H.OSC) circuit inside IC005 also fed to phase comparator and compared with the H. sync pulse in phase. The DC voltage corresponding to the phase difference is fed to H.OSC to control its oscillation frequency. In this way, the H. OSC is automatically controlled to match its oscillation frequency with that of sync pulse. VR009(H.HOLD) is a control for setting the oscillation frequency in a steady state.

The frequency controlled H. drive(H.D) pulse obtained at pin 22 of IC005 is then fed to the EVF board through terminal No. 3 of CN005 to generate H. deflection sawtooth current.

The H. sync pulse obtained at pin 23 is supplied to Microprocessor board through flat cable JA.

3-15 Standby Circuit

Outline

When recording outdoors, using camera and VCR, the power reserve of the battery must be conserved as much as possible, which is the exact function of the standby circuit.

Details

When the standby switch SW001 on the Standby board is set to ON position, practically all circuits in the camera and the VCR are operational, that is, the power from +4.8V/+8.6V sources are supplied to all electric circuits in the Deflection, Process, Micro processor, Auto focus and Viewfinder boards in the camera and +12V is consumed in the VCR.

When the standby switch SW001 on the rear of the camera is set to STANDBY 1 position, +8.6V power source goes only to the +6V DC regulator in order to preheat the heater of pick-up tube and cathode ray tube (CRT). At the same time a standby signal (approx. +3V) generated inside IC005 in Process board by detecting +1.8V (generated inside IC003 in Process board) is supplied to the portable VCR to set the VCR to standby position. Also +4.8V through terminal No. 4 of BI001 on the Standby board, terminal No. 6 of CN011 is fed to base of Q021 to remain the collector potential of beam detector Q021 high (H) in order to avoid reset the white balance condition.

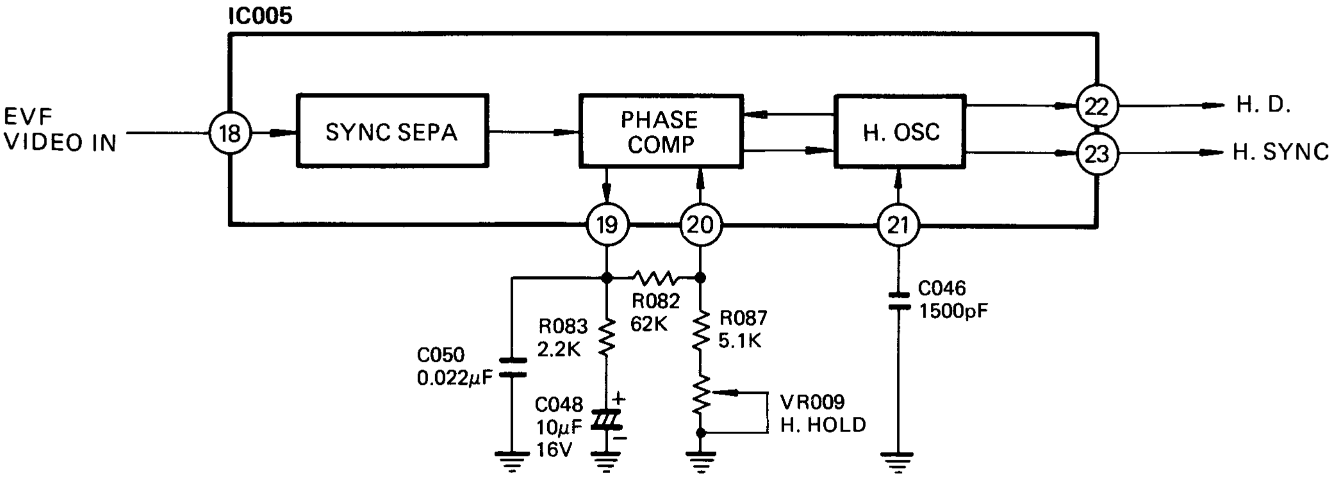


Fig. 3-14 EVF H. Oscillation Circuit

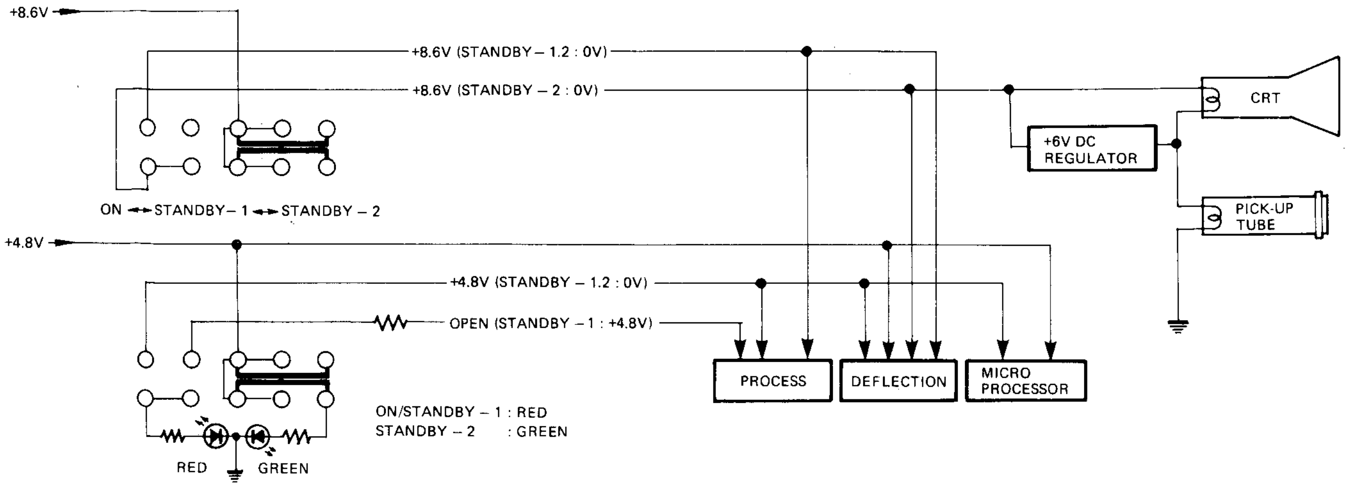

+8.6V
+8.6V (STANDBY – 1.2 : 0V)
+8.6V (STANDBY – 2 : 0V)
ON ◄►STANDBY– 1 ◄►STANDBY – 2
+4.8V
+4.8V (STANDBY – 1.2 : 0V)
OPEN (STANDBY – 1 : +4.8V)
ON/STANDBY – 1 : RED
STANDBY – 2 : GREEN
RED
GREEN
CRT
+6V DC REGULATOR
PICK-UP TUBE
PROCESS
DEFLECTION
MICRO PROCESSOR

Fig. 3-15 Standby Circuit

3-16 Playback Control Circuit

Outline

This circuit sense the recording or playback of the portable VCR.

When the portable VCR is set into the playback mode, this circuit shuts off the audio amplifier, horizontal(H) deflection and high voltage circuits and the playback signal from the VCR is supplied to the viewfinder. When the portable VCR is set into the recording mode, this circuit sets the all circuits in the camera to operating condition and NTSC output signal is supplied to the viewfinder and the portable VCR for recording.

Details

When the portable VCR is set into the recording mode, no DC bias is applied to the base of Q012 and Q012 remains ON, and +4.8V at the emitter of Q012 is supplied to the audio amplifier, H.deflection and high voltage circuit to functioned these circuits normally.

When the portable VCR is set into the playback mode, the playback signal which rides on top of +6V DC is supplied from the VCR to the base of Q012.

Q012 is turned off by the +6V and the +4.8V at the emitter is not supplied to the audio amplifier, H.deflection and high voltage circuits and no high voltages generated.

In this way, the NTSC signal is not generated in the camera and the playback signal from the portable VCR is supplied to the viewfinder.

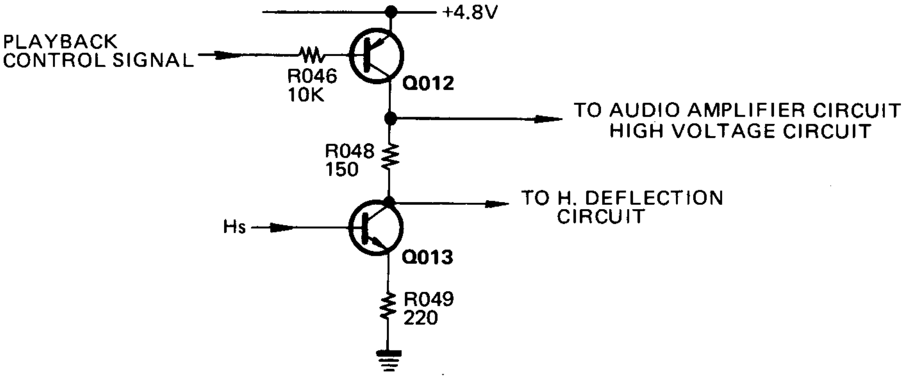

+4.8V
PLAYBACK CONTROL SIGNAL
R046 10K
Q012
TO AUDIO AMPLIFIER CIRCUIT HIGH VOLTAGE CIRCUIT
R048 150
TO H. DEFLECTION CIRCUIT
Hs
Q013
R049 220

Fig. 3-16 Playback Control Circuit

4 Process Board (YFVPKC4850JA)

The Process Board (YFVPKC4850JA) contains following circuits.

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- 4-2 Signal Processing Circuit 21
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  - 4-2-2 Optical Black Clamp Circuit 21
  - 4-2-3 Gamma Correction Circuit 23
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- 4-3 Luminance Signal Processing Circuit 25
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- 4-12 White Balance Setting Circuit 40
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  - 4-14-1 VCR Remote Control Circuit 43
  - 4-14-2 Fade Control Circuit 44

4-1 Pulse Generator Circuit

Outline

This circuit generates all sync pulses used in the camera.

Details

The crystal oscillator which consists of crystal oscillator X001, CT003 (3.58MHz ADJ), C069 and C071 connected between pin 3 and pin 4 of sync generator IC011 oscillates 14.3MHz.
The following pulses are generated from IC011.

Pin 5 : SC0° (0° phase subcarrier)
Pin 6 : SC90° (90° phase subcarrier)
Pin 7 : Pre BL (Preblanking pulse)
Pin 8 : CP1 (Clamp pulse-1)
Pin 9 : Hs (Horizontal scanning start pulse)
Pin 10 : BFP (Burst flag pulse)
Pin 12 : Vs (Vertical scanning start pulse)
Pin 13 : BL (Composite blanking pulse)
Pin 15 : W BL (Wide blanking pulse)
Pin 16 : Sync (Composite sync pulse)

The timing information for each pulse is shown in Fig. 4-1-1.

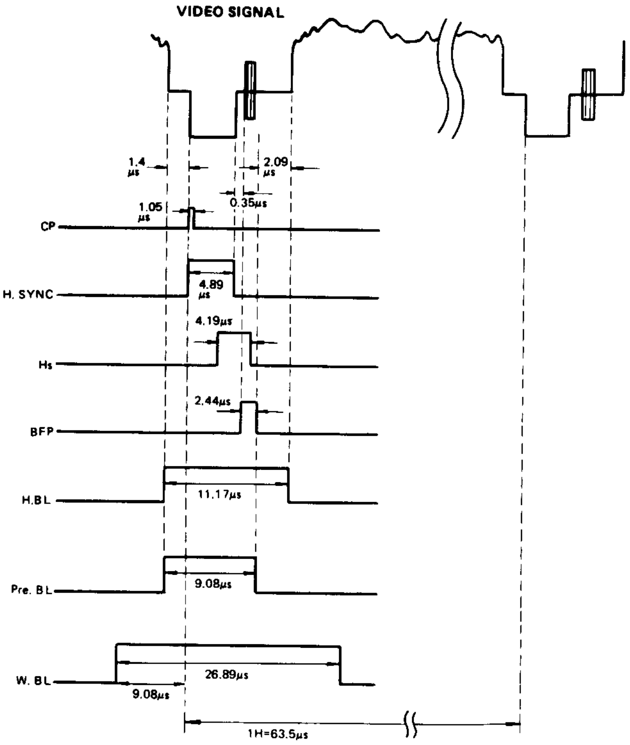


Fig. 4-1-1 Pulses

CT003 (3.58MHz ADJ) is a control for setting the subcarrier frequency. The SC0° and SC90° are respectively supplied to other circuit, through integrators consisting of R4003 and C074, R4004 and C075. The preblanking (Pre BL) pulse is fed to other circuit. The Pre BL pulse Ⓐ is mixed with the clamp pulse-1 (CP1) Ⓑ and wide BL pulse (W.BL) Ⓒ through R4005, R4006 and R149/R148.

The pre BL pulse Ⓐ is also mixed with the blanking (BL) pulse Ⓔ and the clamp pulse-2 (CP2) Ⓕ comes from buffer Q009. The multiplexed signals Ⓓ and Ⓖ thus made are supplied to other circuit.

The Hs pulse Ⓗ is fed to the Deflection board through buffer Q012/Q013 and flat cable JC.

The Hs pulse Ⓗ at the emitter of Q012/Q013 is differentiated by C079 and R157 and clamp pulse-2 (CP2) Ⓕ is made. The CP2 is fed through switching amplifier Q010 and buffer Q009 and mixed with the pre BL pulse Ⓐ and the BL pulse Ⓔ as previously explained.

The vertical scanning start (Vs) pulse is supplied to the Deflection board through R150 and flat cable JC. It is also fed to other circuit through R150.

The wide BL (W.BL) pulse is fed to other circuit through inverter Q011.

The burst flag pulse (BFP) is fed to other circuit.

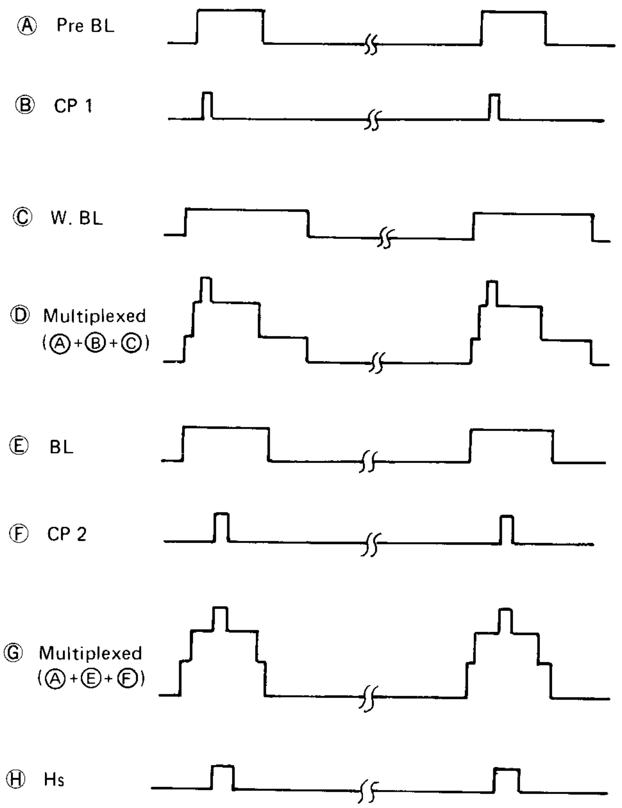


Fig. 4-1-3 Mixed Signals

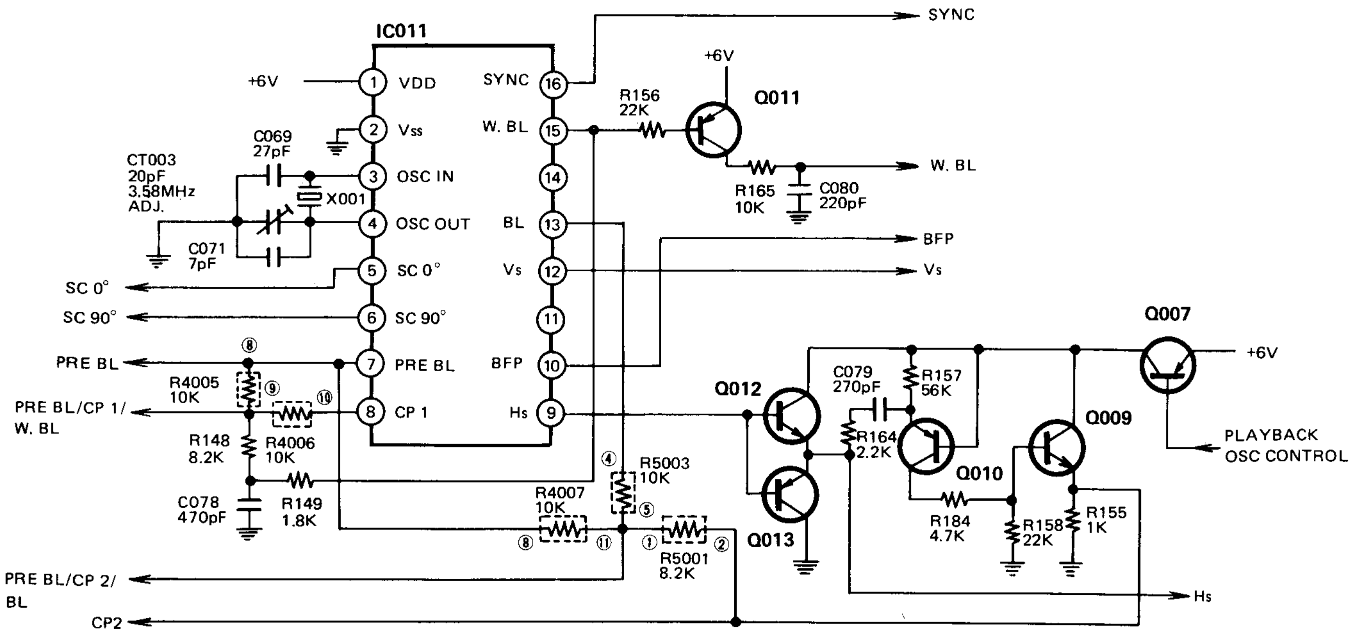

IC011
+6V
① VDD
② Vss
③ OSC IN
④ OSC OUT
⑤ SC 0°
⑥ SC 90°
⑦ PRE BL
⑧ CP 1
⑯ SYNC
⑮ W. BL
⑭
⑬ BL
⑫ Vs
⑪
⑩ BFP
⑨ Hs
SYNC
C069 27pF
CT003 20pF 3.58MHz ADJ.
X001
C071 7pF
SC 0°
SC 90°
PRE BL
PRE BL/CP 1/ W. BL
R4005 10K
R4006 10K
R148 8.2K
C078 470pF
R149 1.8K
PRE BL/CP 2/ BL
CP2
R156 22K
+6V
Q011
R165 10K
C080 220pF
W. BL
BFP
Vs
R4007 10K
R5003 10K
R5001 8.2K
Q012
Q013
C079 270pF
R157 56K
R164 2.2K
Q010
R184 4.7K
R158 22K
Q009
R155 1K
Q007
+6V
PLAYBACK OSC CONTROL
Hs

Fig. 4-1-2 Pulse Generator Circuit

4-2 Signal Processing Circuit

This circuit contains the optical black correction circuit, optical black clamp circuit, gamma correction circuit, automatic iris control detection circuit and automatic gain control circuit.

4-2-1 Optical Black Correction Circuit

Outline

The pick-up tube sends out current corresponding to the incoming light intensity, but even when no light whatsoever reaches the target, an output current called dark current exists. The dark current of the pick-up tube varies depending upon the temperature of the pick-up tube. This color camera uses a metallic strip (optical black) in front of the pick-up tube photoconductive layer to cut off the incoming light at the end of the horizontal period. The optical black causes only the dark current to be detected which is clamped at a specific potential to suppress black level variations. (Refer to 4-2-2 Optical Black Clamp Circuit on page 21). There is a level difference between the dark current detected from the optical black (OB) region and the actual dark current from active area of the tube. The pre BL pulse is mixed to correct the difference. In the pre-video signal, there is a dark shading difference between the dark current from the OB region and from active area of tube in vertical(V) rate. The modulated pre BL pulse is mixed with the pre-video signal to match the V.dark shading corresponding to the OB region to that corresponding to the active area of tube.

Details

The output signal of the Preamplifier board (YFVPKA-0802JA) goes to terminal No. 3 of CN002. After it is mixed with the bias light shading correction signal supplied through R002 from pin 1 of IC008, it goes to the amplifier inside IC001 through pin 5. (Refer to Bias light shading correction signal on page 42). The amplified pre-video signal from the amplifier is mixed with the modulated preblanking (Pre BL) pulse for the optical black (OB) correction.

The vertical(V) sawtooth Ⓐ and parabola Ⓑ signals are fed to the wiper arms of VR012 (OB CORRECTION-SAW) and VR013 (OB CORRECTION-PARA) respectively in the Deflection board.

These waveforms are applied from the Deflection board to both the non-inverted (pin 3) and inverted (pin 4) inputs of OB correction circuit in IC001, where a positive or negative mixed signal Ⓒ of V.sawtooth and parabola signals are made depending on the position of these controls.

VR014 (OB OFFSET) controls the positive input potential of OB correction circuit to change the DC level of mixed signal Ⓒ.

The multiplexed signal of the clamp pulse-1 (CP1), Pre BL pulse and W.BL pulse is fed from the pulse generator circuit to the pulse separator inside IC001 through pin 22, where the CP1, Pre BL pulse and W.BL pulse are separated.

The separated Pre BL pulse is fed to the OB correction circuit inside IC001. The amplified pre-video signal Ⓓ is then modulated by the signal Ⓒ and Pre BL pulse for correcting the difference of dark current level and matching the dark current shading (Ⓔ & Ⓕ).

VR012 and VR013 are controls for matching the dark current shading and VR014 is for correcting the difference of dark current level.

The corrected pre-video signal is then fed to the clamp circuit in IC001.

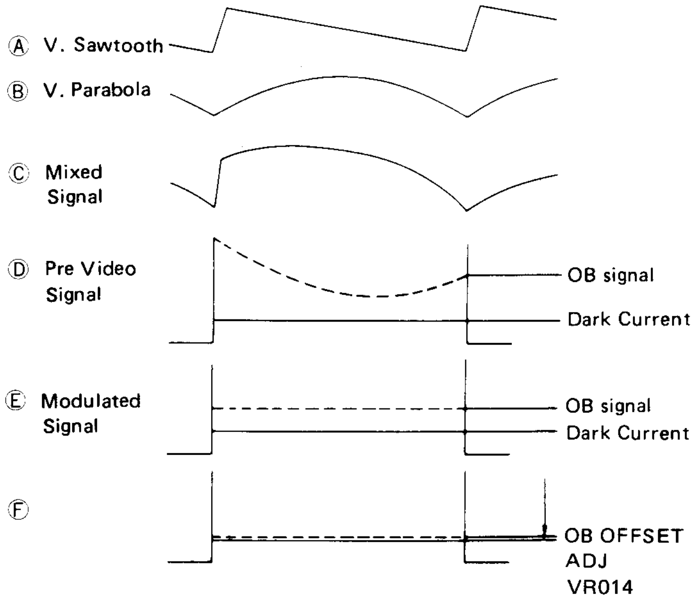


Fig. 4-2-2 OB Correction

4-2-2 Optical Black Clamp Circuit

Outline

The pick-up tube sends an output current corresponding to the incoming light intensity, but even when no light reaches the target, an output current called dark current is obtained.

The dark current of the pick-up tube varies with the temperature of the pick-up tube. In a TV camera using a pick-up tube, the dark level of the output signal is unstable with respect to changing temperature.

In a color camera using the single carrier frequency multiplexing system, the red(R) and blue(B) signals modulated at 3.58MHz are riding on top of the green-(G) signal. Thus the black level of the R and B signals

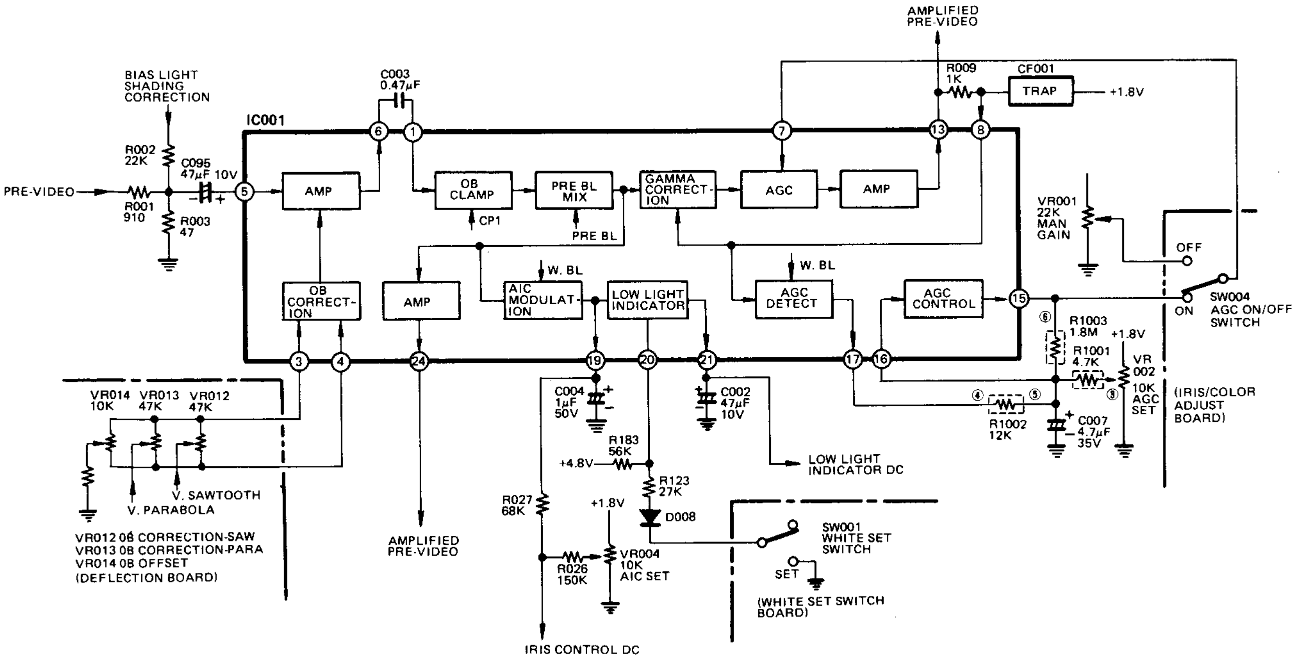

AMPLIFIED PRE-VIDEO
BIAS LIGHT SHADING CORRECTION
C003 0.47µF
IC001
R009 1K
CF001
TRAP
+1.8V
R002 22K
C095 47µF 10V
PRE-VIDEO
R001 910
R003 47
AMP
OB CLAMP
CP1
PRE BL MIX
PRE BL
GAMMA CORRECT-ION
AGC
AMP
VR001 22K MAN GAIN
OFF
ON
SW004 AGC ON/OFF SWITCH
OB CORRECT-ION
AMP
W. BL
AIC MODULAT-ION
LOW LIGHT INDICATOR
W. BL
AGC DETECT
AGC CONTROL
R1003 1.8M
+1.8V
R1001 4.7K
VR 002 10K AGC SET
(IRIS/COLOR ADJUST BOARD)
VR014 10K
VR013 47K
VR012 47K
V. SAWTOOTH
V. PARABOLA
VR012 OB CORRECTION-SAW
VR013 OB CORRECTION-PARA
VR014 OB OFFSET
(DEFLECTION BOARD)
AMPLIFIED PRE-VIDEO
C004 1µF 50V
R183 56K
+4.8V
C002 47µF 10V
R1002 12K
C007 4.7µF 35V
LOW LIGHT INDICATOR DC
R027 68K
+1.8V
R123 27K
D008
R026 150K
VR004 10K AIC SET
SW001 WHITE SET SWITCH
SET
(WHITE SET SWITCH BOARD)
IRIS CONTROL DC

Fig. 4-2-1 Signal Processing Circuit

are free from temperature variations because they are independent of pick-up tube dark current. However, the black level of the Y signal which is obtained by removing the modulated R and B components from the pick-up tube output increases or decreases according to temperature variations. Therefore, the black level balance between the YL and R signals, and between YL and B signals are lost due to a temperature variations and this causes a change in color reproduction. This circuit receives the pre-video signal from the optical black correction circuit and clamps its dark current level for correcting the black level variation.

Details

The pre-video signal which contains the modulated red/blue signals and green signal is fed from the optical black correction circuit to the optical black clamp circuit inside IC001. A metallic strip (optical black) for cutting the incoming light at the end of the horizontal scanning period is built into the pick-up tube faceplate. When the beam scans the optical black portion Ⓖ , the dark current of the pick-up tube is produced and this signal portion (Ⓗ) is clamped to a fixed DC potential, so that the black level variation due to a change of dark current is sensed.

In other words, the dark current level Ⓗ′ of the pre-video signal Ⓗ supplied to the clamp circuit inside IC001 is clamped by the clamp pulse-1 (CP1) Ⓒ′ separated from the multiplexed signal of CP1, pre BL and wide BL pulses inside IC001. (The multiplexed signal of CP1, pre BL and wide BL pulses are generated in the pulse generator circuit, mixed and then fed to the pulse separator where they are separated.)

Therefore, even if the dark current level drifts due to the temperature variations, the DC potential of the optical black (OB) level is held constant.

In this way, the black level variation is corrected.

The clamped video signal is mixed with the pre BL pulse from the pulse separator and the noise during the blanking period is removed.

The mixed signal is fed to the gamma correction circuit, automatic iris control detection circuit and tracking signal generator through amplifier in IC001.

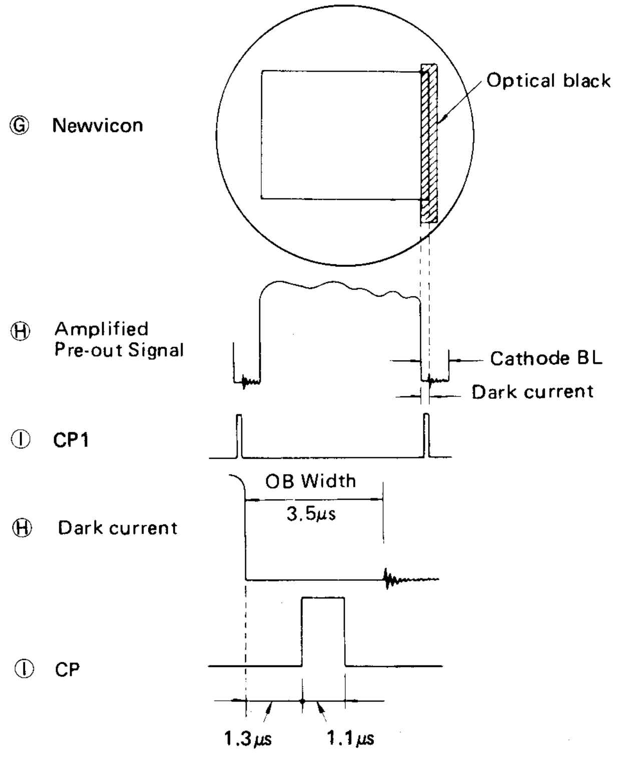

Ⓖ Newvicon
Optical black
Ⓗ Amplified Pre-out Signal
Cathode BL
Dark current
Ⓘ CP1
OB Width
3.5µs
Ⓗ Dark current
Ⓘ CP
1.3µs
1.1µs

Fig. 4-2-3 OB Clamp

4-2-3 Gamma Correction Circuit

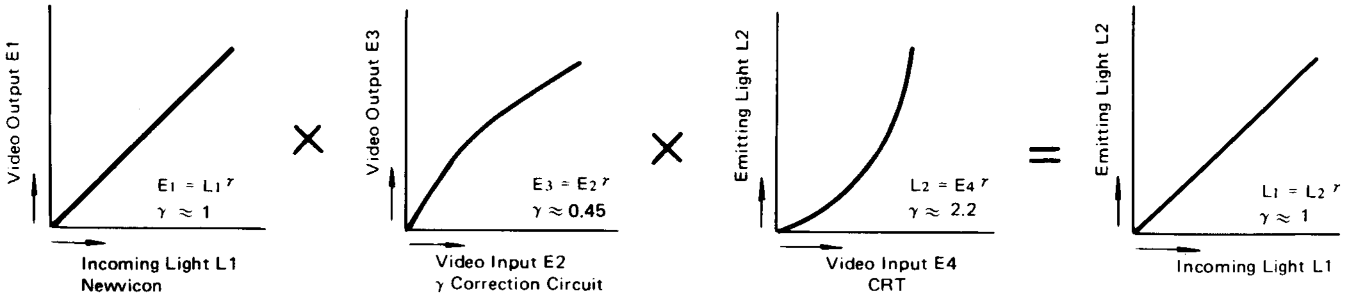


Fig. 4-2-4 Gamma Correction

Outline

This circuit corrects the non-linear photoelectric conversion characteristic of cathode ray tube (CRT) and reproduces a linear picture of high fidelity on the monitor.

In order for a televised picture to have the same contrast gradation as the original scene, the system (including the pick-up tube, signal processing inside camera and monitor, and CRT) gamma must be equal to 1.

The gamma characteristic of Newvicon is approx. 1.0 and the gamma characteristic of the monitor CRT is approx. 2.2, so that the gamma characteristic of the gamma correction circuit should be approx. 0.45, which makes the total gamma to be approx. 1.0 as shown in Fig. 4-2-4.

Details

The pre-video signal is fed to the gamma(r) correction circuit and undergoes the gamma correction.

Since the modulated red(R) and blue(B) signals are ridden on the green(G) signal, the negative feedback gamma correction circuit is adapted.

4-2-4 Automatic Iris Control Detection Circuit

Outline

This circuit detects the DC voltage corresponding to the light intensity and sends this DC voltage to the automatic iris control drive circuit in the Micro processor board.

Details

The wide BL (W.BL) pulse Ⓠ separated from CP1/pre BL/W.BL mixed signal is supplied to the AIC modulation circuit inside IC001 from the pulse separator. The pre-video signal Ⓡ is fed from the pre BL mix circuit to the modulation circuit, where the pre-video signal Ⓡ is modulated by the W.BL pulse Ⓠ

The modulated pre-video signal Ⓢ is peak-rectified in the modulation circuit and converted into DC voltage corresponding to the pre-video level i.e., the incoming light intensity. This DC voltage is fed through pin 19 of IC001 and terminal No. 2 of CN003 to the automatic iris control circuit in the Micro processor board together with the DC voltage set by VR004 (AIC SET) which sets the normal iris stop at the standard light intensity. The DC voltage is also supplied to the low light indicator circuit in IC001.

When the camera is operated in the normally illuminated scene, the output from the low light indicator at pin 21 of IC001 is high level. However, when the camera is aimed at the weakly illuminated scene, the output becomes low level and it is sent to the Micro processor board for displaying the graphics "LIGHT".

When the white set switch SW001 is set to the SET position, the cathode of D008 is grounded and the voltage at pin 20 of IC001 decreases to keep the voltage at pin 20 high level.

In this way the graphics are not displayed on the viewfinder while the automatic white balance is being set.

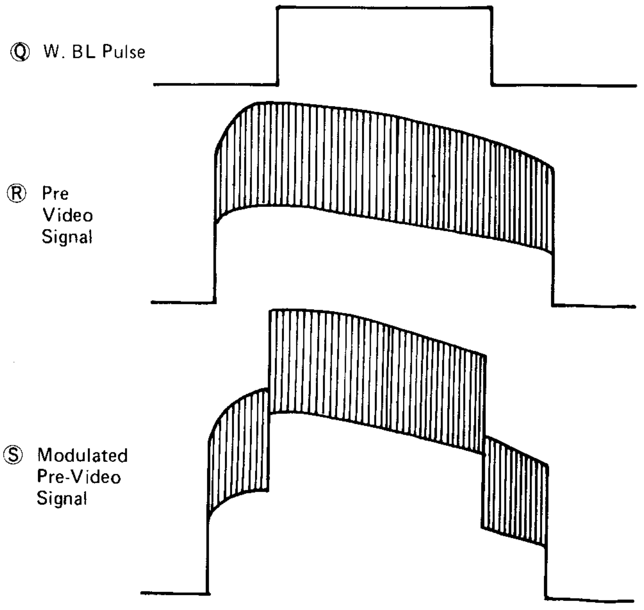


Fig. 4-2-5 Automatic Iris Control Detection

4-2-5 Automatic Gain Control Circuit

Outline

This circuit amplifies the preamplifier output signal. The amplified signal level is maintained constant by automatically controlling the gain of the amplifier. The gain of the amplifier starts to vary only when the lens iris is fully opened.

Details

The pre-video signal from the gamma correction circuit in IC001 is fed through the AGC amplifier and amplifier to trap CF001 which removes the 3.58MHz modulated component and the luminance (Y) signal is obtained. The Y signal is then applied to the AGC detect circuit where the Y signal Ⓣ is modulated by the wide BL pulse Ⓤ from the pulse separator and the modulated Y signal Ⓥ is made for detecting signal level corresponding to the center image. The modulated Y signal Ⓥ is peak-rectified in the AGC detect circuit and converted into DC voltage corresponding to the Y signal level i.e., the incoming light intensity. This DC voltage is the fed through pins 17 and 16 of IC001 to the AGC control circuit where it is compared with the reference DC voltage. The error between the DC voltages is fed through the AGC ON/OFF switch SW004 to the AGC amplifier to control its gain.

When the camera is used in the normally illuminated scene, the signal level is maintained constant by automatically adjusting the lens iris. Therefore the gain of AGC amplifier does not change. However, when the camera is aimed at the weakly illuminated scene and lens iris becomes wide open, the Y signal level is decreased. The decreased Y signal level is detected by the AGC detection circuit and converted into the DC voltage. This DC voltage is fed through the AGC control circuit and the AGC ON/OFF switch SW004 to the AGC amplifier to control the gain of amplifier.

In this way the signal level corresponding to normal and relatively high illumination is kept constant by the lens iris opening, while the signal level corresponding to relatively low illumination is controlled by the AGC circuit.

The gain control pre-video signal which has the modulated red and blue signal at pin 13 of IC001 is supplied to the luminance signal processing circuit and red and blue separation circuit.

VR002 (AGC SET) sets the gain of the amplifier at the standard light intensity in the automatic gain control mode.

VR001 (MAN GAIN) set the gain of the amplifier at the standard light intensity in the manual gain control mode.

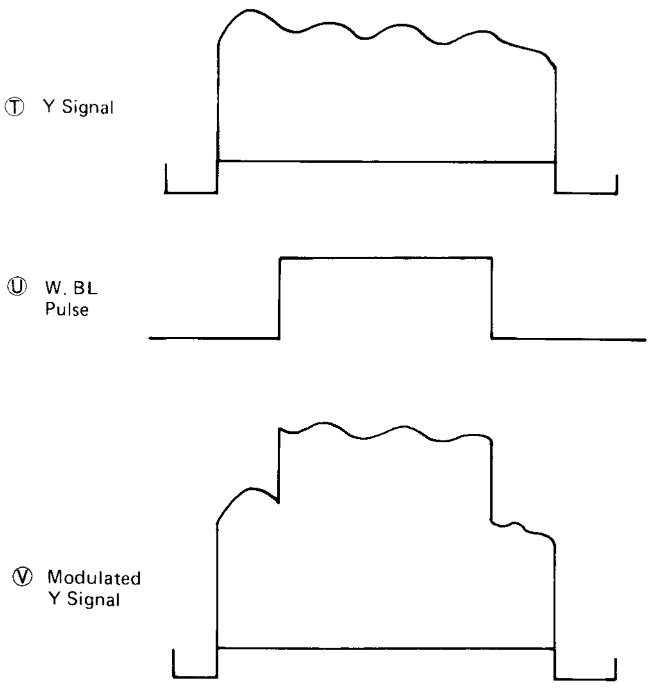


Fig. 4-2-6 Automatic Gain Control Detection

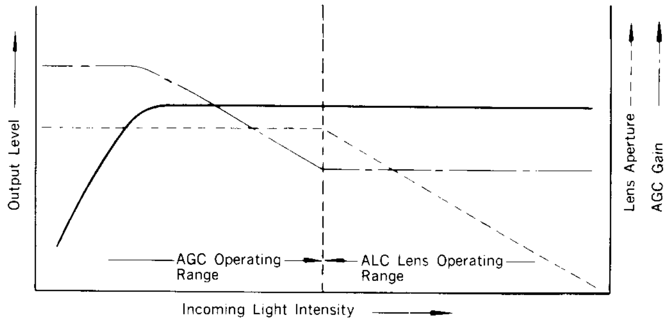


Fig. 4-2-7 AGC Operation

4-3 Luminance Signal Processing Circuit

This circuit consists of YH signal circuit, YL signal circuit and Y(edge) signal circuit.

4-3-1 YH Signal Circuit

Outline

This circuit receives the amplified pre-video signal from the automatic gain control circuit and generates the luminance (YH) signal having high frequency response characteristic.

Details

The amplified pre-video signal is fed from the AGC circuit through pin 13 of IC001 to trap CF001 which removes the 3.58MHz modulated component and luminance (Y) signal is obtained. The Y signal at pin 8 of IC001 is fed to the YH white suppress circuit, where the high level of Y signal is slightly suppressed. The suppressed Y signal is then supplied to 2.8MHz low pass filter CF002, where the frequency response of Y signal is limited to 2.8MHz, and the YH signal having high frequency response characteristic is generated.

The YH signal is then mixed with the vertical edge signal supplied from the vertical edge signal generator circuit through R025. After its level is set by VR003 (Y GAIN), the YH signal is supplied to the horizontal aperture signal circuit in IC002.

4-3-2 YL Signal Circuit

This circuit receives the amplified pre-video signal from the automatic gain control circuit and generates the luminance (YL) signal having low frequency response characteristic.

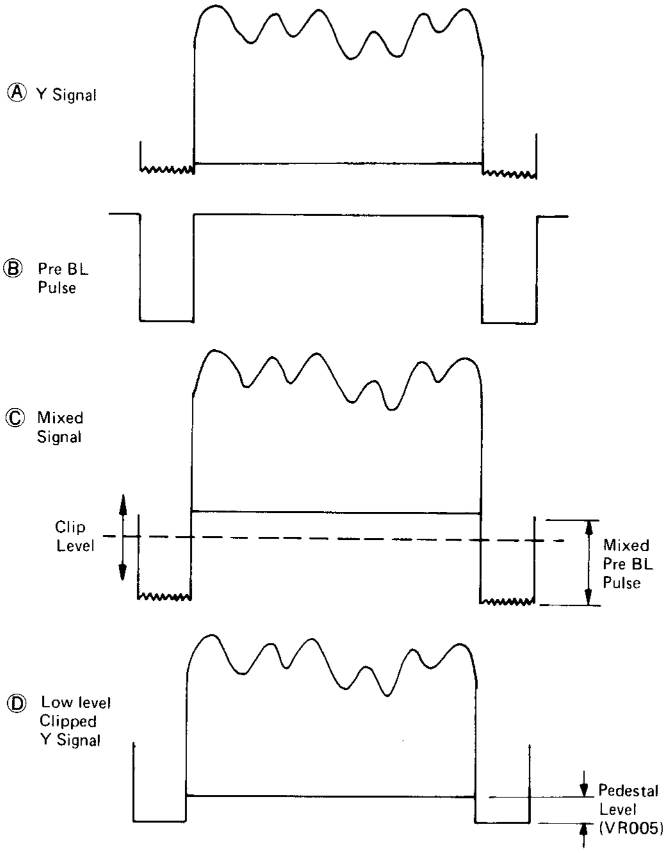

Ⓐ Y Signal
Ⓑ Pre BL Pulse
Ⓒ Mixed Signal
Clip Level
Mixed Pre BL Pulse
Ⓓ Low level Clipped Y Signal
Pedestal Level (VR005)

Fig. 4-3-2 YL Pedestal Setting

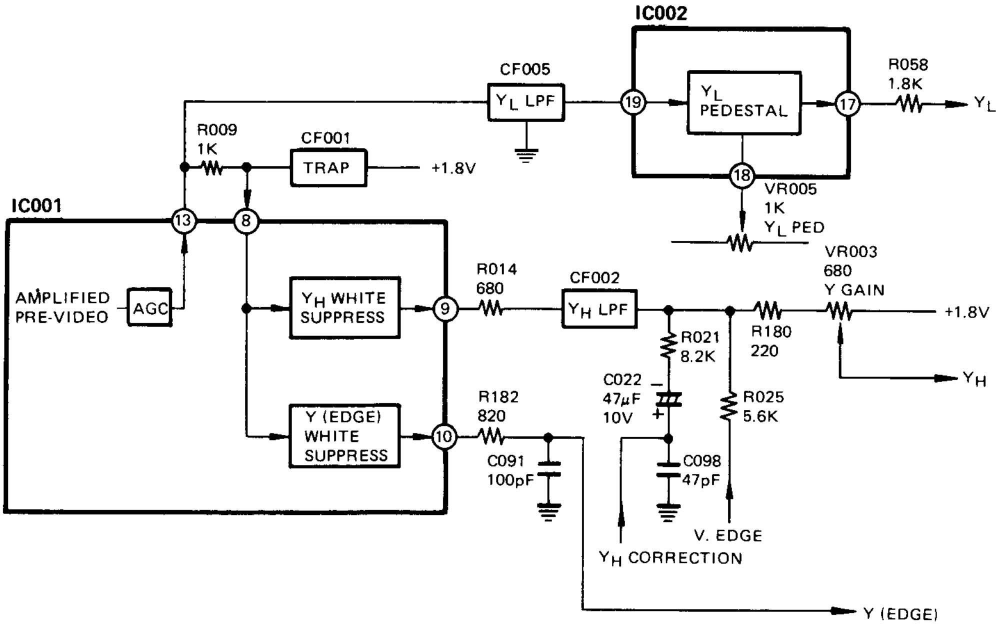

IC002
CF005
Y_L LPF
19
Y_L PEDESTAL
17
R058 1.8K
Y_L
18
VR005 1K Y_L PED
R009 1K
CF001
TRAP
+1.8V
IC001
13
8
AMPLIFIED PRE-VIDEO
AGC
Y_H WHITE SUPPRESS
9
R014 680
CF002
Y_H LPF
VR003 680 Y GAIN
+1.8V
R021 8.2K
R180 220
Y_H
Y (EDGE) WHITE SUPPRESS
10
R182 820
C022 47μF 10V
R025 5.6K
C091 100pF
C098 47pF
V. EDGE
Y_H CORRECTION
Y (EDGE)

Fig. 4-3-1 Luminance Signal Processing Circuit

Details

The amplified pre-video signal is fed from the AGC circuit through pin 13 of IC001 to 0.5MHz low pass filter CF005, where the 3.58MHz modulated component is removed and the luminance (YL) signal of which frequency response is limited to 0.5MHz is obtained. The YL signal Ⓐ thus made is fed to the YL pedestal circuit inside IC002, where YL signal Ⓐ is mixed with the pre BL pulse Ⓑ and the mixed signal Ⓒ is made. The mixed signal's low level pre BL portion is clipped and its pedestal level is set (Ⓓ). The clip level (pedestal level) is set by VR005 (YL PED).

The YL signal whose pedestal level is set is supplied through pin 17 of IC002 and pin 13 of IC005 to the R-YL/B-YL signal circuit in the red and blue separation & Chroma processing circuit.

CN004 and CN007 are used for factory adjustment.

4-3-3 Y(edge) Signal Circuit

Outline

This circuit generates the luminance (Y(edge)) signal for making the vertical edge signal.

Details

The Y signal obtained by removing the 3.58MHz from the pre-video signal with trap CF001 is supplied to the Y(edge) white suppress circuit inside IC001, where the high level of Y signal is suppressed and the luminance (Y(edge)) signal for making the vertical edge signal is obtained. This signal is fed through pin 10 of IC001 to the vertical edge signal generator circuit.

4-4 Horizontal Aperture Signal Generator Circuit

Outline

This circuit generates the horizontal(H) edge (aperture) signal to enhance the horizontal resolution.

Details

The luminance (YH) signal having high frequency response is fed from the YH signal circuit to the H.aperture generator circuit.

When the camera is aimed at an object Ⓐ for example, the signal Ⓑ passed through pin 1 of IC002, signal Ⓒ delayed 0.15 μs by delay line CF003 and amplified in the H.aperture generator circuit and signal Ⓓ which results from the delayed YH signal being reflected back through CF003 and delayed again (0.3 μs) appear at the output of the H.aperture generator circuit where they are mixed in fixed proportions to make up the H.aperture signal Ⓔ.

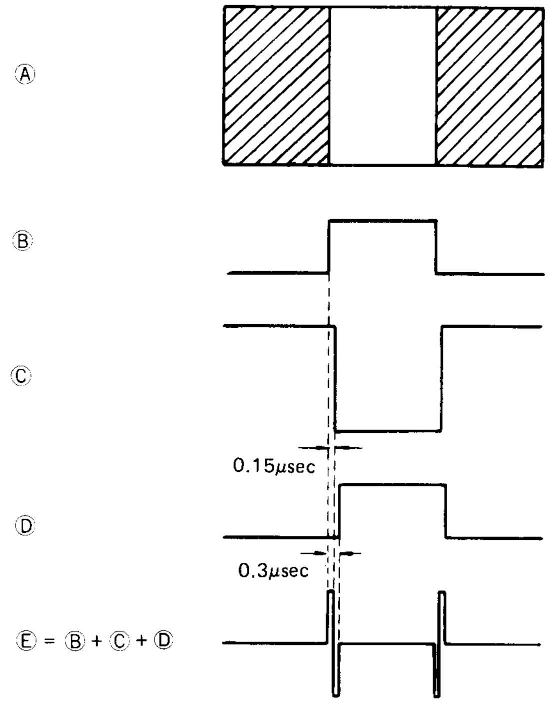


Fig. 4-4-1 Horizontal Aperture Signal

The H.aperture signal obtained in this way is applied through pin 23 of IC002 and pin 7 of IC004 to the H.aperture noise suppress/coring circuit, where the noise mixed in the H.aperture signal Ⓕ is removed (Ⓖ).

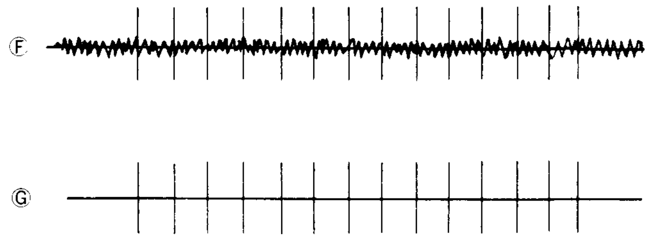


Fig. 4-4-2 H. Aperture Noise Coring

The H.aperture signal which undergoes the noise coring is then supplied through pin 8 of IC004 to the Y/-chroma/aperture mix circuit, where it is mixed with the luminance and chrominance signal.

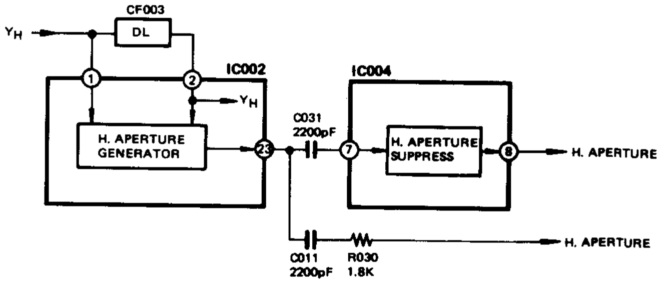


Fig. 4-4-3 H. Aperture Signal Generator Circuit

4-5 Vertical Edge Signal Generator Circuit

Outline

This circuit generates a vertical edge signal for increasing the vertical resolution by enhancing vertical edge contrast.

Details

The luminance (Y(edge)) signal Ⓐ , for making the vertical(V) edge signal, supplied from the Y(edge) signal circuit is fed to the Y(edge) modulator in IC006 through pin 5. In the Y(edge) modulator, the Y(edge) signal modulates the subcarrier signal which is applied from the pulse generator circuit through pin 6. The modulated signal is sent to the glass delay line DL003 which delays the input signal by 1H line. The 1H delayed modulated signal is supplied to the full-wave detector circuit in IC006 through VR013 (V.EDGE BALANCE). The detected 1H delayed Y(edge) signal Ⓑ is fed to the differential amplifier in IC006, where it is mixed with the undelayed Y(edge) signal Ⓐ applied through pin 5 of IC006 to form a vertical edge signal Ⓒ . The vertical edge signal is sent to the low pass filter CF008 where the 3.58MHz and its harmonics are removed. The vertical edge signal from the low pass filter is fed to the V.edge amplifier in IC003 through pin 4. The amplified V.edge signal is fed to the detection circuit in IC003, where the positive V.edge signal Ⓓ is generated. This signal is sent to the NTSC signal processing circuit through R047.

The V.edge signal Ⓓ is fed to the mixing circuit in IC003, where it is mixed with the amplified V.edge and V.edge signal Ⓔ is made. The V.edge signal Ⓔ is sent to the vertical transient spurious correction circuit inside IC003 through pin 9, and to the YH signal circuit where it is mixed with the YH signal through R025.

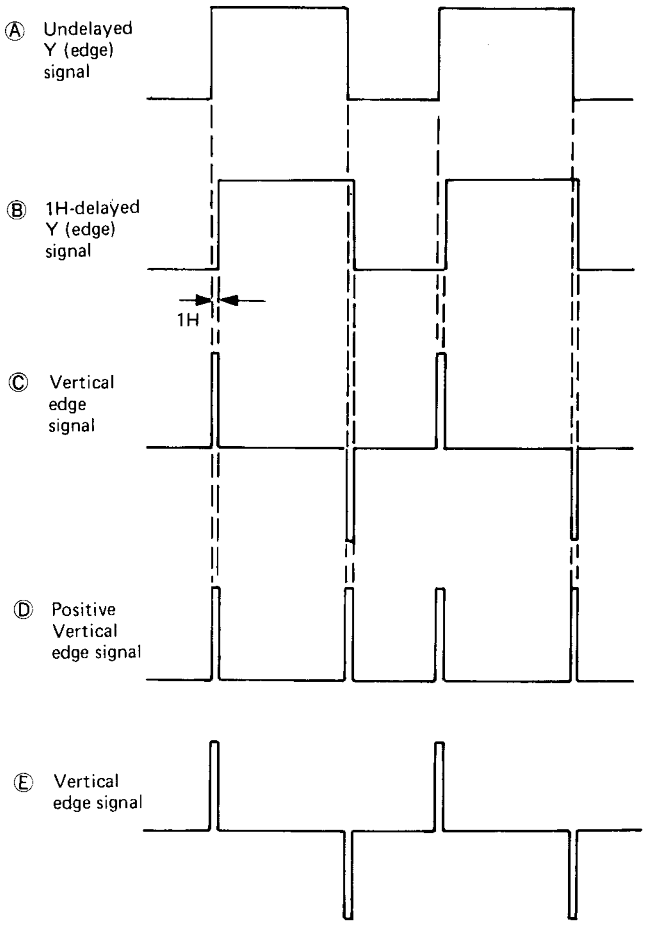

Ⓐ Undelayed Y (edge) signal
Ⓑ 1H-delayed Y (edge) signal
1H
Ⓒ Vertical edge signal
Ⓓ Positive Vertical edge signal
Ⓔ Vertical edge signal

Fig. 4-5-1
Vertical Edge Signal

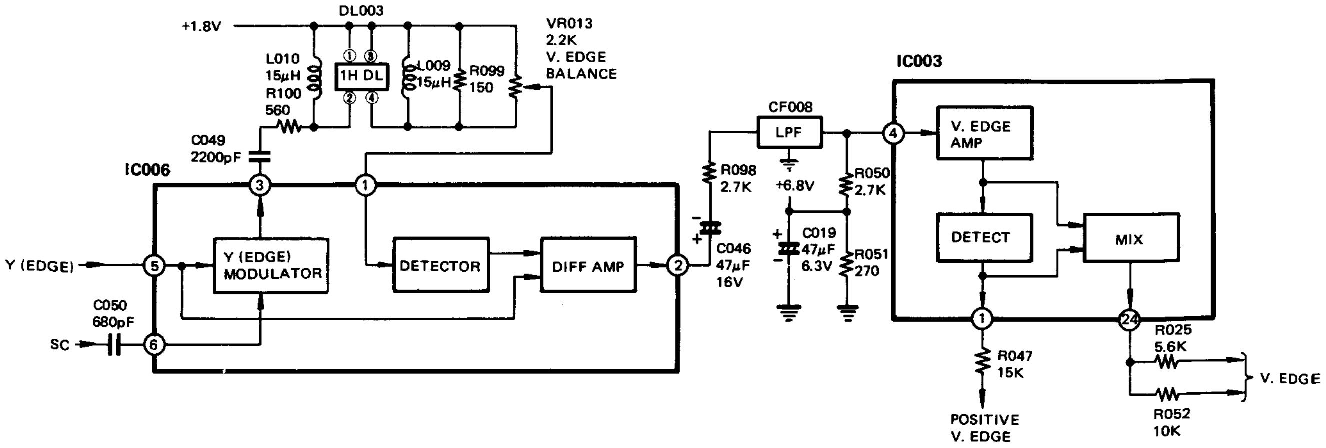

DL003
+1.8V
VR013
2.2K
V. EDGE
BALANCE
L010
15μH
R100
560
1H DL
L009
15μH
R099
150
① ③ ② ④
C049
2200pF
IC006
Y (EDGE)
Y (EDGE) MODULATOR
DETECTOR
DIFF AMP
C050
680pF
SC
IC003
CF008
LPF
R098
2.7K
+6.8V
R050
2.7K
C046
47μF
16V
C019
47μF
6.3V
R051
270
V. EDGE AMP
DETECT
MIX
R025
5.6K
R047
15K
R052
10K
POSITIVE
V. EDGE
V. EDGE

Fig. 4-5-2 Vertical Edge Signal Generator Circuit

4-6 Red and Blue Separation & Chroma Processing

Circuit

This circuit consists of the red and blue separation circuit, the vertical transient spurious correction circuit, the shading correction, the tracking correction circuit, the R-YL signal circuit, the B-YL signal circuit and the chroma clip signal circuit.

4-6-1 Red and Blue Separation Circuit

Outline

This circuit takes out the modulated red(Rc) and blue-(Bc) signals from the combined preamplifier output signal which is composed of a green(G) signal mixed with 3.58MHz modulated red(Rc) and blue(Bc) signal.

Details

The amplified pre-video signal Ⓐ obtained at pin 13 of IC001 is fed to 3.58MHz band pass filter (BPF) CF006 where the Rc/Bc signal Ⓑ is detected.The detected Rc/Bc signal is then supplied through VR007 (Rc/Bc GAIN) to the R/B gain control circuit.

When the lens iris becomes wide open, the modulation depth of red and blue signals decreases.

It is compensated by controlling the gain of the R/B gain control circuit with the DC voltage corresponding to the lens iris opening. This DC voltage is fed from the lens to the R/B gain control circuit through terminal No. 3 of CN003, D005 and pin 14 of IC003.

The gain controlled Rc/Bc signal is then supplied to the 90° phase shifter through pre BL mix circuit where the noise on the blanking period is removed. The 90° phase-shifted Rc/Bc signal Ⓒ obtained at pin 11 of IC003 is applied to the R/B separation circuit inside IC005 through pin 2. CT001 (Rc/Bc SEPARATION-1) is a control for shifting the phase of Rc/Bc signal by 90°.

The Rc/Bc signal Ⓑ at pin 6 of IC003 is supplied to 1H delay line DL001 where it is delayed one horizontal line (63.5 μsec). 1H delayed Rc/Bc signal is then sent to the vertical transient spurious correction circuit inside IC003 through VR006 (Rc/Bc SEPARATION-2) and pin 18. (The vertical transient spurious correction circuit will be described later.)

The Rc/Bc signal Ⓓ undergoes the vertical transient spurious correction and inverted in the correction circuit is applied to the R/B separation circuit inside IC005 through pin 24.

In the R/B separation circuit, the 90° phase-shifted Rc/Bc signal Ⓒ and the inverted 1H-delayed Rc/Bc signal Ⓓ are added forming the Rc signal Ⓔ, and the Rc/Bc signal Ⓒ and the Rc/Bc signal Ⓓ are subtracted each other forming the Bc signal Ⓕ.

The Rc and Bc signals thus separated are fed to the respective shading/tracking correction circuits.

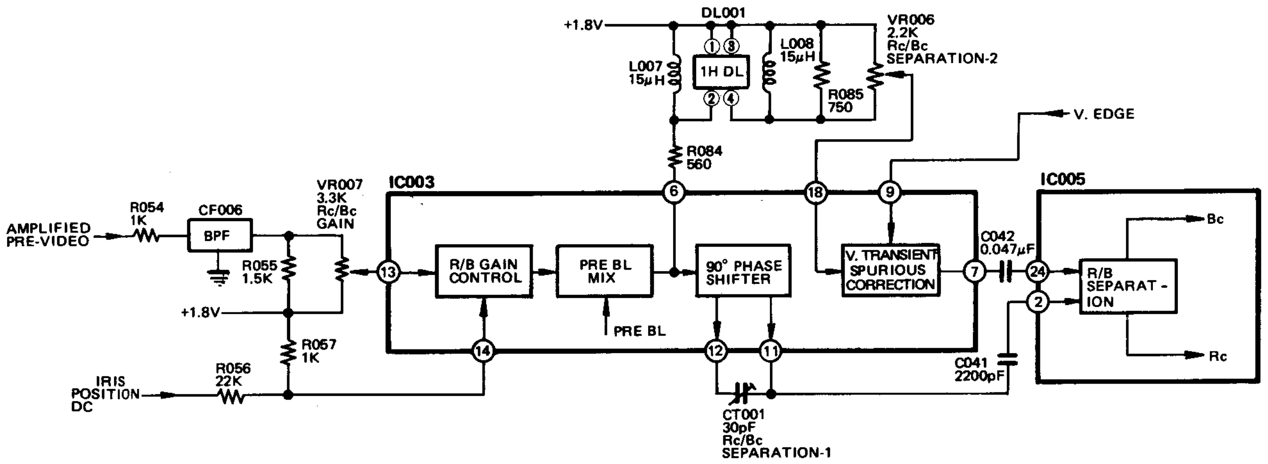

+1.8V
DL001
1H DL
L007 15μH
L008 15μH
R085 750
VR006 2.2K Rc/Bc SEPARATION-2
V. EDGE
R084 560
VR007 3.3K Rc/Bc GAIN
IC003
IC005
AMPLIFIED PRE-VIDEO
R054 1K
CF006
BPF
R055 1.5K
+1.8V
R057 1K
R056 22K
IRIS POSITION DC
R/B GAIN CONTROL
PRE BL MIX
PRE BL
90° PHASE SHIFTER
V. TRANSIENT SPURIOUS CORRECTION
C042 0.047μF
C041 2200pF
R/B SEPARAT-ION
Bc
Rc
CT001 30pF Rc/Bc SEPARATION-1

Fig. 4-6-1 Red and Blue Separation Circuit

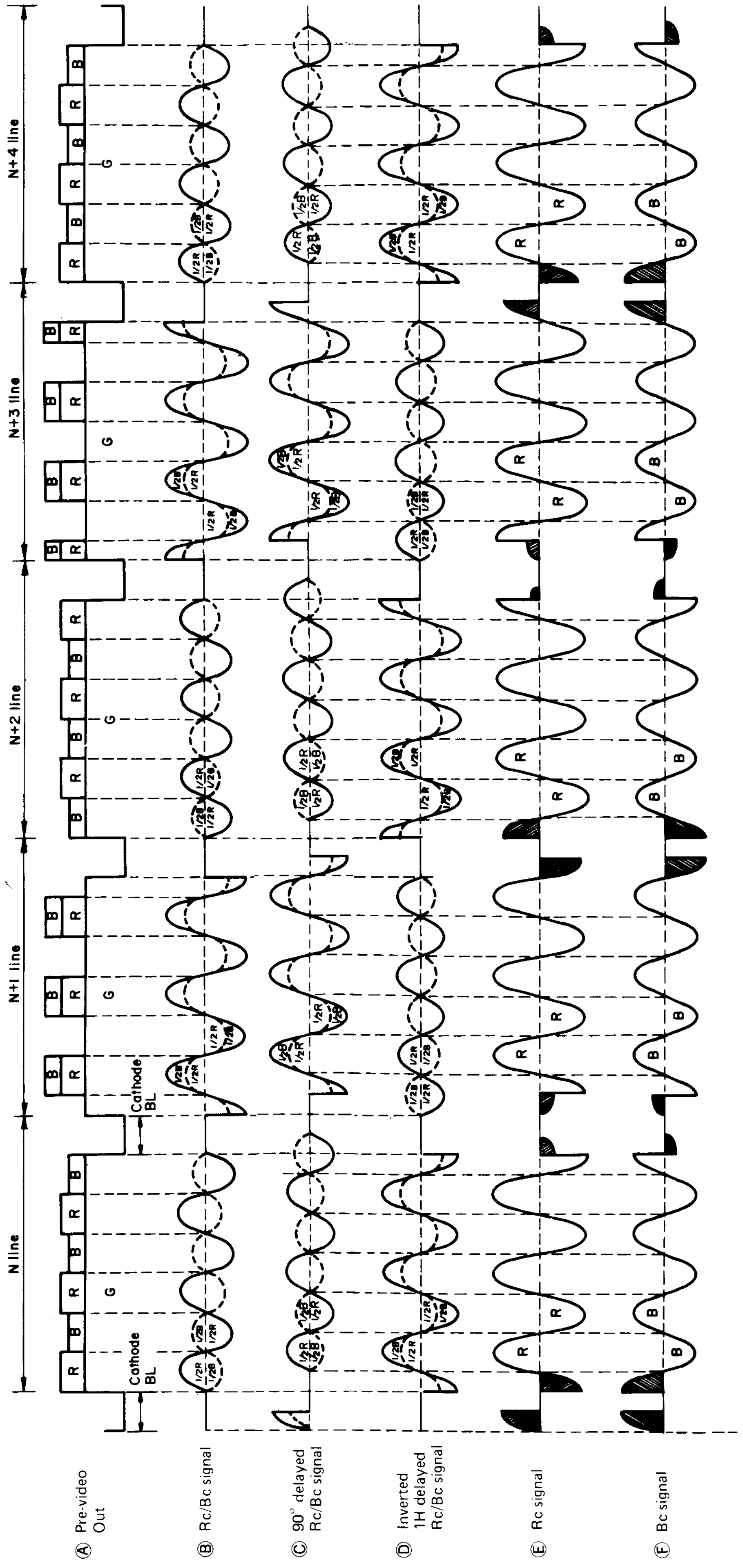

N+4 line
N+3 line
N+2 line
N+1 line
N line
R
B
G
Cathode BL
1/2R
1/2B
Ⓐ Pre-video Out
Ⓑ Rc/Bc signal
Ⓒ 90° delayed Rc/Bc signal
Ⓓ Inverted 1H delayed Rc/Bc signal
Ⓔ Rc signal
Ⓕ Bc signal

Fig. 4-6-2 Rc/Bc Signal Separation

4-6-2 Vertical Transient Spurious Correction Circuit

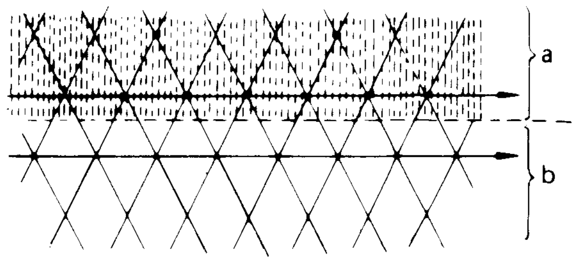
Outline

As described previously in 4-6-1 red and blue separation circuit, the Rc and Bc signals are separated from each other by addition and subtraction of the Rc/Bc signal delayed one line(1H) and the phase-shifted Rc/Bc signals but not delayed.

When a pattern such as shown below is seen by the camera, the Rc/Bc signal which is not delayed appears as in Ⓘ, and the Rc/Bc signal delayed one line(1H) becomes as in Ⓙ.

Therefore, it is impossible to secure vertical correlation between Rc/Bc signals of N+1 line, and a "spurious signal" differing in level of Rc and Bc signals against Y signal Ⓗ is generated, and the vertical(V) edge of the object is unnaturally colored by this "spurious signal".

The vertical transient spurious correction circuit controls the amplitude of 1H-delayed Rc/Bc signal Ⓙ corresponding to the N+1 line with vertical(V) edge signal Ⓚ and the signal Ⓛ is made. This provides vertical correlation between Rc/Bc signals Ⓘ and Ⓛ prior to color separation.



a : Dark object
b : Bright object

Fig. 4-6-3

Details

The vertical edge signal Ⓚ in Fig. 4-6-4 is sent from the vertical edge signal generator circuit to the vertical transient spurious correction circuit inside IC003 through pin 9 of IC003. In this circuit, those parts of the 1H-delayed Rc/Bc signal Ⓙ which do not correlate with the Rc/Bc signal Ⓘ (not 1H-delayed) are controlled in level by the vertical edge signal Ⓚ. The corrected Rc/Bc signal Ⓛ is fed to the R/B separation circuit inside IC005 through pin 7 of IC003 and pin 24 of IC005.

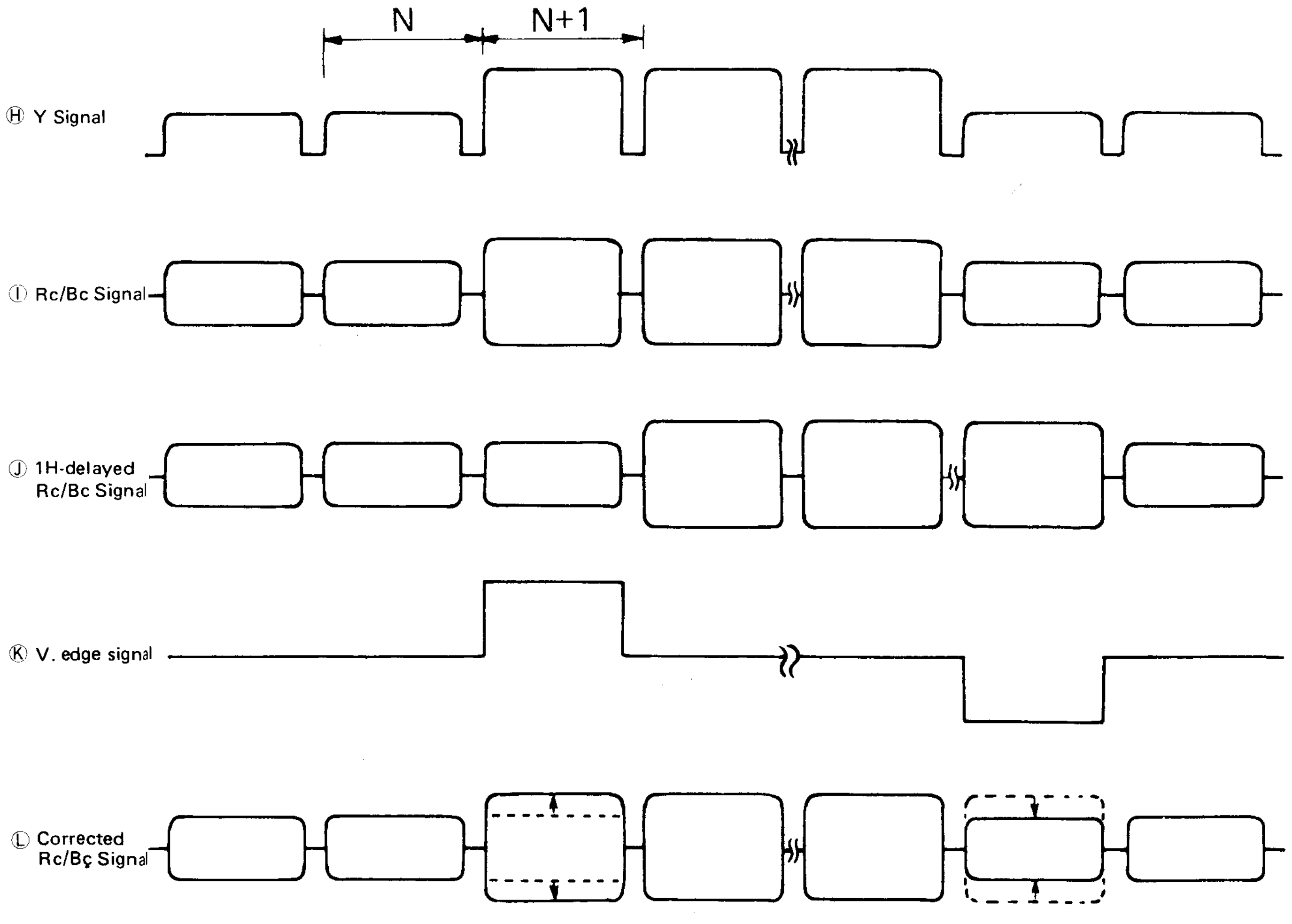


Fig. 4-6-4 Vertical Transient Spurious Correction

4-6-3 Shading Correction Circuit

Outline

Even when dynamic focus is applied to grid-4(G4) of pick-up tube, the non-uniformity of modulation due to uneven focus on the target can not be completely eliminated.

Modulation non-uniformity also occurs due to non-uniform structure in the photoconductive layer of the pick-up tube (manufacture tolerance).

The shading correction circuit compensates for residual picture shading using horizontal(H) and vertical(V) sawtooth and parabola signals.

Details

. Red shading correction

The horizontal shading correction signal and the vertical shading correction signal supplied from Shading correction board (YFVPKA0808JA) through terminal No. 7 of CN001, and supplied to the red shading/tracking correction circuit inside IC005 through pin 22.

Suppose a uniformly illuminated white object is seen by the camera and the RC signal has a shading (unevenness of amplitude) such as that shown in Fig. 4-6-5 Ⓜ. This is sent to the shading/tracking correction circuit from the Rc/Bc separation circuit inside IC005. In this case, the shading correction signal Ⓝ is applied to the correction circuit.

In this case, the four red shading controls are adjusted to generate the shading correction signal Ⓝ at pin 7 of IC003 on shading correction board, and it is applied to the correction circuit. The Rc signal Ⓜ is modulated by the shading correction signal Ⓝ and the corrected signal Ⓞ is produced. The shading correction signal mixed with the Rc signal Ⓞ is removed in the correction circuit and the Rc signal Ⓟ is obtained. In this way, the shading of the Rc signal is corrected.

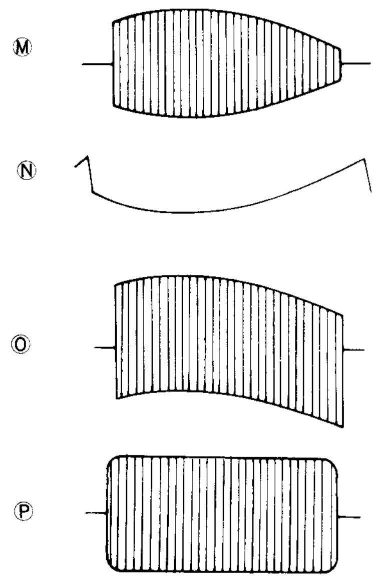


Fig. 4-6-5 Shading Correction

The corrected Rc signal is then fed to the R-YL signal circuit inside IC005.

. Blue shading correction

As in the case of red shading correction, the horizontal shading correction signal and the vertical shading correction signal are supplied from shading correction board (YFVPKA0808JA) through terminal No. 6 of CN001, and fed to the shading/tracking correction circuit inside IC005 through pin 3, where it modulates the modulated blue(Bc) signal (supplied from the R/B separation circuit) for the shading correction. The shading-corrected Bc signal is then applied to the B-YL signal circuit inside IC005.

4-6-4 Tracking Correction Circuit

Outline

In this color camera, the red(R) and blue(B) signals modulated at 3.58MHz (high frequency component) are riding on top of the green(G) signal (low frequency component) when they are extracted from the pick-up tube.

The photoelectric conversion characteristic of the pick-up tube is different between the high frequency component and low frequency component.

The modulation depth of Rc and Bc signals corresponding to the weakly illuminated scene is reduced due to the over-beam in the pick-up tube.

As a result, the R and B signals obtained by detecting the Rc and Bc signals do not track with the YL signal.

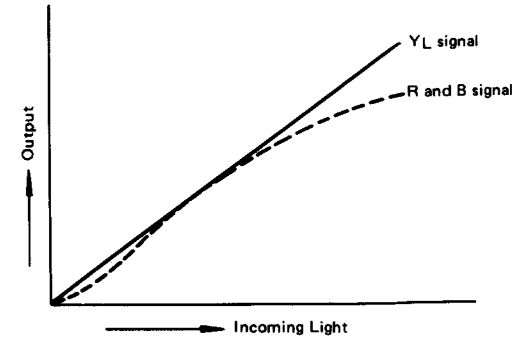


Fig. 4-6-6 Mistracking of YL and R/B Signal

This circuit generates the tracking signals for correcting the characteristic of the R and B signals, and tracks them with the YL signal.

Details

The amplified pre-video signal Ⓠ (which contains the modulated red and blue signals as well as the green signal) obtained at pin 24 of IC001 is fed to the low pass filter consisting of L101 and C001, where the 3.58MHz modulated component is removed and a luminance (Y) signal Ⓡ is made.

The Y signal Ⓡ is fed through pin 19 to the tracking signal generator inside IC003 where a tracking-1 signal Ⓢ, a tracking-2 signal Ⓣ and a tracking-3 signal Ⓤ is generated respectively.

The tracking-1 signal Ⓢ at pin 16 of IC003 is supplied to VR012 (B. TRACKING-1) and VR016 (R. TRACKING-1) for correcting the relatively low level of R and B signals.

The tracking-2 signal Ⓣ at pin 17 of IC003 is fed to VR011 (B. TRACKING-2) and VR014 (R. TRACKING-2) for correcting the relatively higher portion of R and B signals.

The tracking-3 signal Ⓤ at pin 15 of IC003 is sent to VR010 (B. TRACKING-3) and VR015 (R. TRACKING-3) for correcting the high level of R and B signals. These tracking correction signals are supplied through the tracking controls to the R. shading/tracking correction circuit and B. shading/tracking correction circuit inside IC005, where they modulates the Rc and Bc signals Ⓥ come from the R/B separation circuit for correcting the linearity of Rc and Bc signal Ⓦ. In this way, the R and B signals match the YL signal.

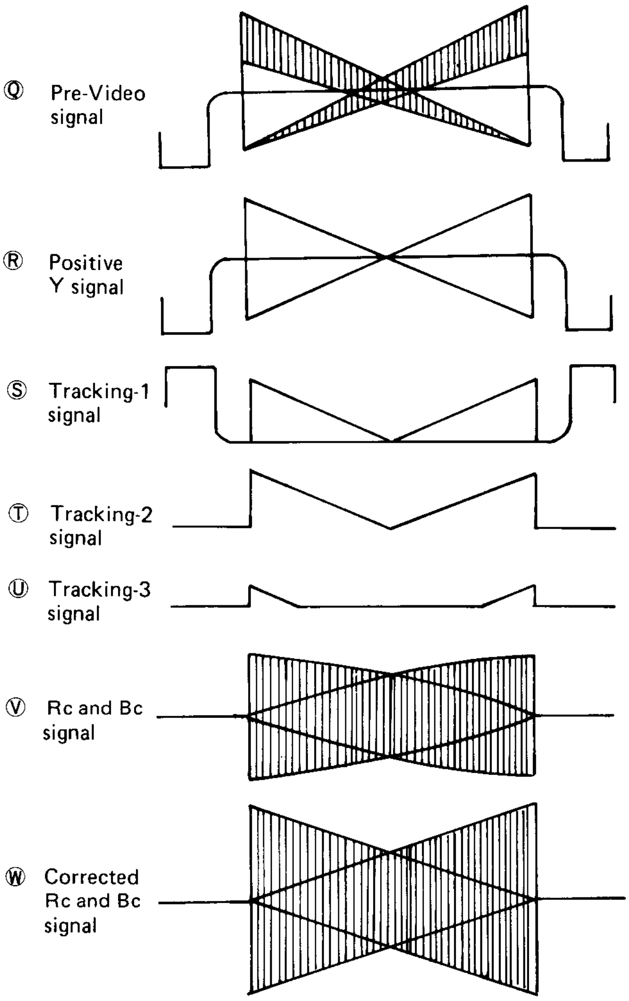

Ⓠ Pre-Video signal
Ⓡ Positive Y signal
Ⓢ Tracking-1 signal
Ⓣ Tracking-2 signal
Ⓤ Tracking-3 signal
Ⓥ Rc and Bc signal
Ⓦ Corrected Rc and Bc signal

Fig. 4-6-8 Tracking Correction-1

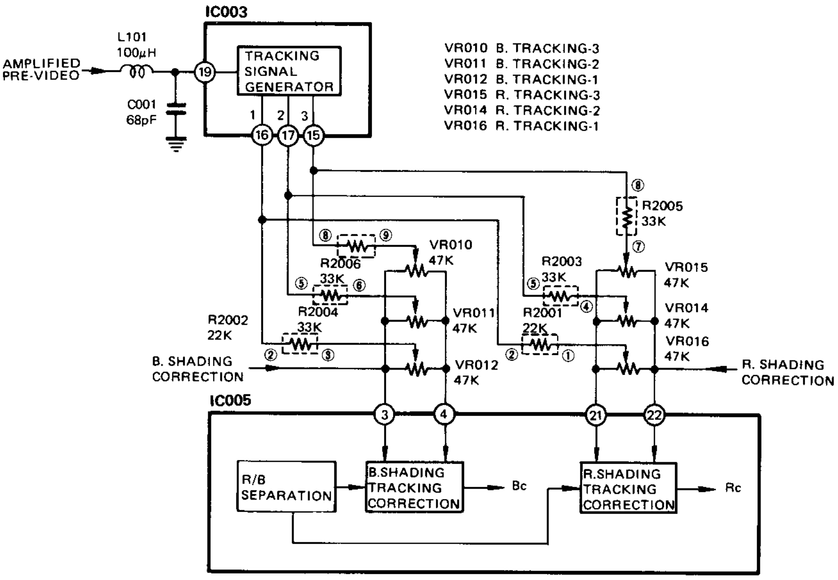

IC003
L101
100μH
AMPLIFIED PRE-VIDEO
19
C001
68pF
TRACKING SIGNAL GENERATOR
1 2 3
16 17 15
VR010 B. TRACKING-3
VR011 B. TRACKING-2
VR012 B. TRACKING-1
VR015 R. TRACKING-3
VR014 R. TRACKING-2
VR016 R. TRACKING-1
⑧
R2005
33K
⑦
⑧ ⑨
R2006
VR010
47K
⑤ 33K ⑥
R2004
33K
R2002
22K
VR011
47K
VR012
47K
② ③
B. SHADING CORRECTION
R2003
⑤ 33K
R2001 ④
22K
② ①
VR015
47K
VR014
47K
VR016
47K
R. SHADING CORRECTION
IC005
3 4 21 22
R/B SEPARATION
B.SHADING TRACKING CORRECTION
Bc
R.SHADING TRACKING CORRECTION
Rc

Fig. 4-6-7 Tracking Correction Circuit

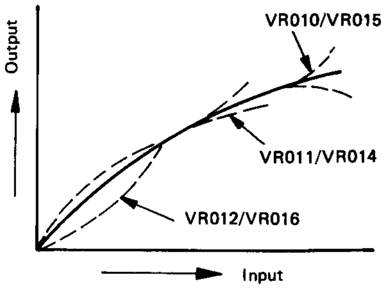


Fig. 4-6-9 Tracking Correction-2

4-6-5 R-YL Signal Circuit

Outline

This circuit receives the modulated red(Rc) signal from the red shading/tracking correction circuit and detects the red signal. The detected red signal and the YL signal supplied from the YL signal circuit make the R-YL color difference signal. The R-YL signal is fed to the chroma encoding circuit.

Details

The Rc signal Ⓐ from the red shading/tracking correction circuit is fed to the gain control circuit whose gain is controlled for the automatic white balancing. The gain controlled Rc signal is sent to the amplifier through the pre BL mixing circuit where the noise during the blanking period of Rc signal is removed. The positive Rc signal Ⓑ and negative Rc signal Ⓒ are obtained at the output of amplifier and they are forwarded to the detector.

The detected Rc signal Ⓓ is then fed to the R-YL amplifier. The YL signal from the YL signal circuit is also supplied to the R-YL amplifier where the R-YL color difference signal is made up. The R-YL signal is sent to the low pass filter. The detector which extracts the red signal produces a unwanted 7.16MHz ripple signal Ⓓ. The 7.16MHz component is removed by the low pass filter leaving only the red signal Ⓔ.

The frequency response of red signal and YL signal also become same by the low pass filter.

The resultant red signal is fed through pin 14 of IC005 to the chroma encoding circuit.

The R-YL signal at pin 14 of IC005 is fed through inverter Q001 to the YH signal circuit and mixed with YH signal to compensate for NTSC luminance signal. VR002 (COLOR ADJUST) which is located on the side of camera is a control for fine adjustment of the color balance. VR017 (R. GAIN) is a presetting control for the red signal level. VR018 (R. PED) is a control for setting the red pedestal.

SW001 is a YL ON/OFF switch for disconnecting the YL signal. CN007 is used for the factory adjustment.

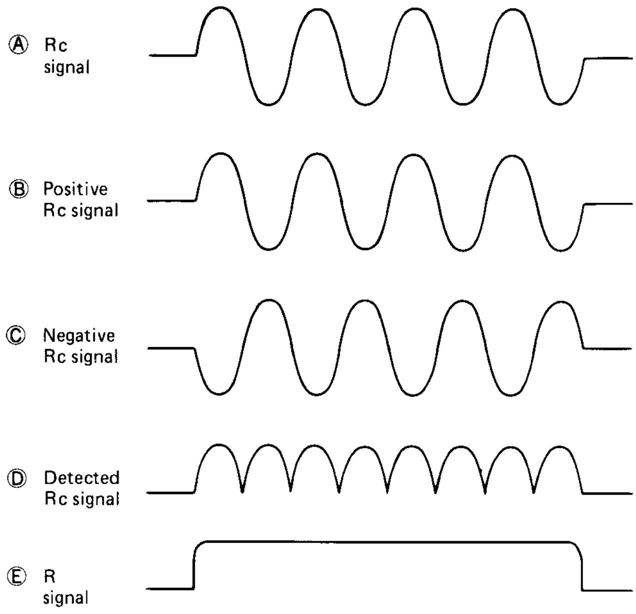

Ⓐ Rc signal
Ⓑ Positive Rc signal
Ⓒ Negative Rc signal
Ⓓ Detected Rc signal
Ⓔ R signal

Fig. 4-6-10 Red Signal Detection

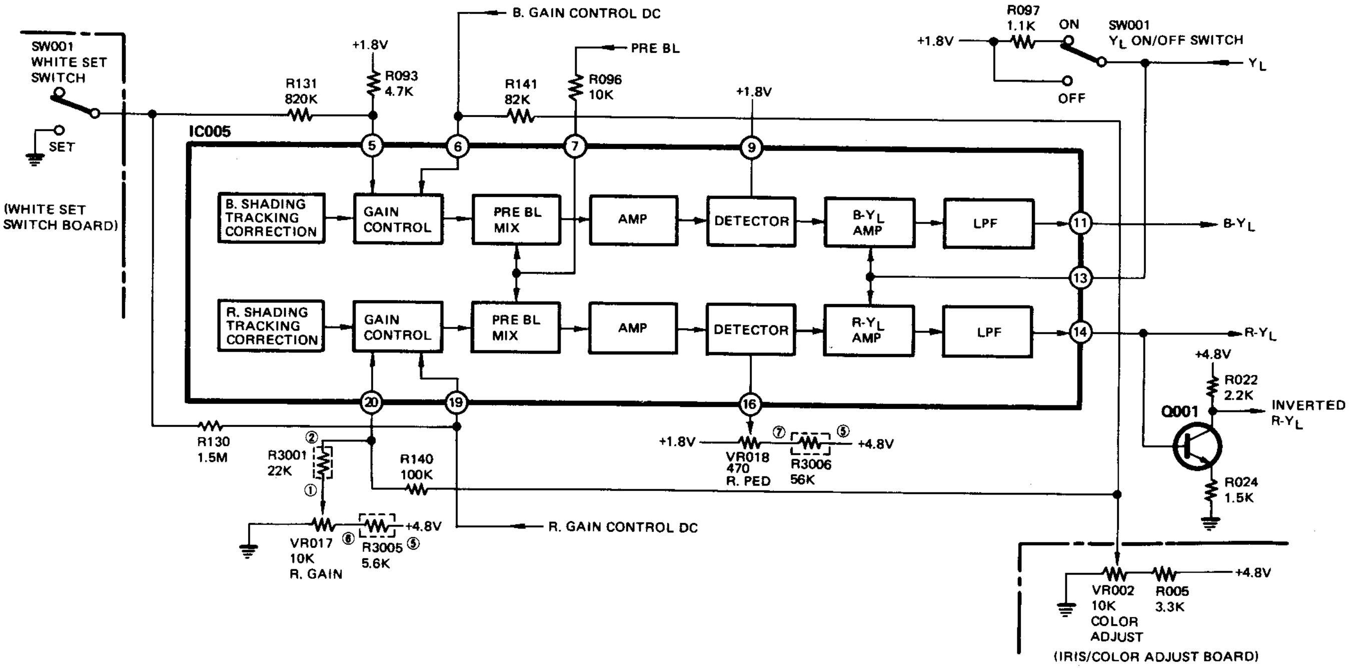

SW001
WHITE SET
SWITCH
SET
(WHITE SET
SWITCH BOARD)
R131
820K
+1.8V
R093
4.7K
B. GAIN CONTROL DC
R141
82K
PRE BL
R096
10K
+1.8V
IC005
5
6
7
9
B. SHADING
TRACKING
CORRECTION
GAIN
CONTROL
PRE BL
MIX
AMP
DETECTOR
B-YL
AMP
LPF
11
B-YL
13
R. SHADING
TRACKING
CORRECTION
GAIN
CONTROL
PRE BL
MIX
AMP
DETECTOR
R-YL
AMP
LPF
14
R-YL
20
19
16
R130
1.5M
②
R3001
22K
①
R140
100K
VR017
10K
R. GAIN
⑥
R3005
5.6K
⑤
+4.8V
R. GAIN CONTROL DC
+1.8V
VR018
470
R. PED
⑦
R3006
56K
⑤
+4.8V
R097
1.1K
+1.8V
ON
OFF
SW001
YL ON/OFF SWITCH
YL
+4.8V
R022
2.2K
Q001
INVERTED
R-YL
R024
1.5K
VR002
10K
COLOR
ADJUST
R005
3.3K
+4.8V
(IRIS/COLOR ADJUST BOARD)

Fig. 4-6-11 R-YL/B-YL Signal Circuit

4-6-6 B-YL Signal Circuit

Outline

This circuit uses the same design as the R-YL signal circuit. The circuit receives the modulated blue(Bc) signal from the blue shading/tracking correction circuit and converts it to the blue signal. The B-YL signal is made by the detected red signal and YL signal supplied from the YL signal circuit, and fed to the chroma encoding circuit.

Details

The Bc signal from the blue shading/tracking correction circuit in IC005 is sent to B-YL amplifier after it undergoes the gain control, the preblanking mixing, the amplification and detection. The B-YL signal made by the detected B signal and the YL signal is fed to the chroma encoding circuit through the low pass filter which removes the 7.16MHz ripple signal.

4-6-7 Chroma Clip Signal Circuit

Outline

When the over input signal level is fed to the amplifier or the beam of pick-up tube is insufficient to discharge the target due to excessive light reflected from a brightly illuminated object, the modulated red/blue signal components riding on to top of the green signal become saturated (Ⓖ and Ⓗ).

Therefore, the bright picture parts turn into an unnatural green color due to lack of red and blue.

This circuit receives the luminance(Y) signal and makes the chroma clip signal for clipping the unnatural green color. The chroma clip signal is sent to the chroma encoding circuit.

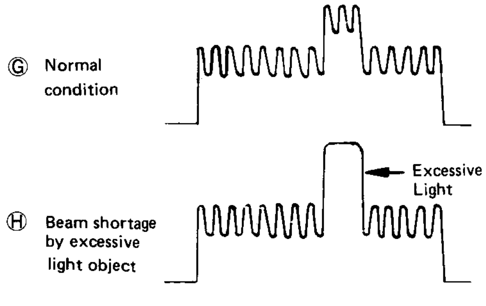


Fig. 4-6-12 Beam Shortage

Details

The pre-video signal at pin 24 of IC001 is fed to low pass filter which consists of L101 and C001 and the luminance(Y) signal Ⓘ is made. The Y signal Ⓘ is fed through pin 19 of IC003 to the white clip circuit where the high Y signal level Ⓙ is detected. The detected high Y signal Ⓙ , signal Ⓚ delayed 0.5 μs by delay line CF007and signal Ⓛ which results from the delayed signal Ⓚ being reflected back through CF007 and delayed again (1 μs) appear at the input of NAM (non-additive mixing) circuit.

The mixing signal Ⓜ (Ⓙ + Ⓛ) is non-additively mixed with the signal Ⓚ and a chroma clip signal Ⓝ is made. The chroma clip signal Ⓝ is fed from the NAM circuit to the chroma encoding circuit through the pulse separator/buffer and pin 23 of IC003, and to the NTSC signal processing circuit through R048 together with the positive vertical edge signal comes through R047 (Refer to 4-5 Vertical Edge Signal Generator Circuit.).

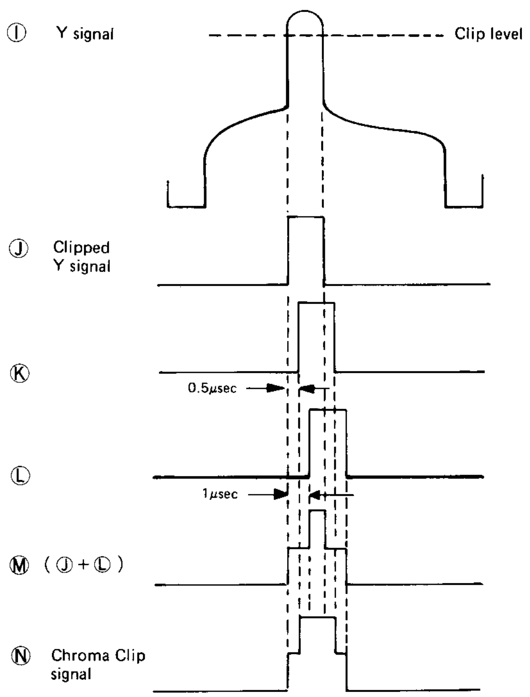


Fig. 4-6-14 Chroma Clip Signal

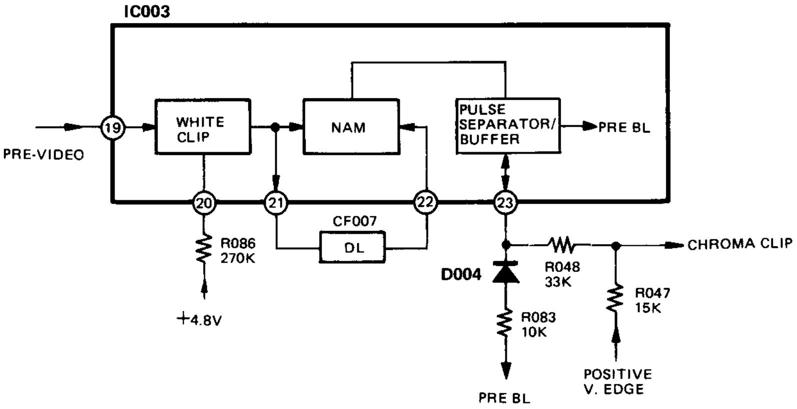


Fig. 4-6-13 Chroma Clip Signal Circuit

4-7 Chrominance Encoding Circuit

This circuit contains the +2.5V power circuit, the chrominance signal generator circuit, the chroma clip/-suppression circuit and the white set detection circuit.

4-7-1 +2.5V Power Circuit

Outline

This circuit generates the regulated +2.5V DC which is used as power supply for IC004.

Details

+1.8V DC generated inside IC003 is fed through pin 5 and L002 to the emitter of Q003 which is used as a diode. The +2.5V DC obtained at the collector of Q003 is supplied to pin 6 of IC004 as a power supply.

4-7-2 Chrominance Signal Generator Circuit

Outline

This circuit receives the R-YL and B-YL color difference signals and modulates these base band color difference signal on two subcarrier differing in phase by 90° to generate a chrominance signal. The burst signal is also generated in this circuit.

Details

The R-YL color difference signal is fed from the R-YL signal circuit in IC005 to the R-YL clamp circuit in IC004 through pin 3, where the blanking period of R-YL signal is clamped by the clamp pulse-2(CP2) from the pulse separator in IC004. The clamped R-YL signal is then supplied to the R-YL balance modulator where it is mixed with the burst flag pulse (BFP) applied from the pulse generator circuit through pin 2 of IC004 and clamp circuit. The R-YL signal with the burst flag pulse (BFP) modulates the 0° phase subcarrier (SC 0°) applied to the modulator from the pulse generator circuit through pin 14 of IC004. The modulator produces an AM modulated (suppressed carrier) signal.
Similarly, the B-YL color difference signal is fed from the B-YL signal circuit to the B-YL balance modulator circuit in IC004 through pin 4 of IC004 and the B-YL clamp circuit, where the B-YL signal is mixed with the burst flag pulse (BFP) supplied through pin 2 of IC004 and BFP clamp circuit. The B-YL signal with the burst flag pulse (BFP) and the 90° phase-shifted subcarrier (its phase is delayed 90° with respect to R-YL subcarrier) applied to the modulator through pin 16 of IC004 undergo suppressed carrier quadrature modulation. The R-YL modulated signal and the B-YL modulated signal is added forming the chrominance signal with the burst. The chrominance signal is then forwarded to the chroma clip/suppress circuit.

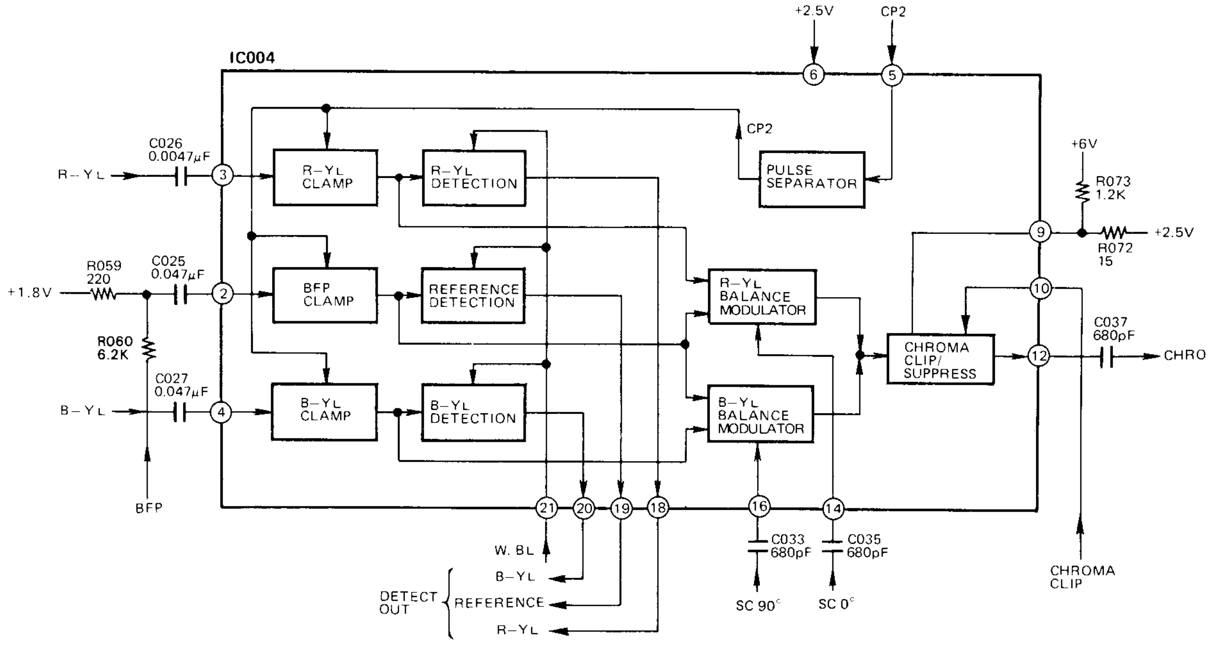

+2.5V
CP2
IC004
6
5
CP2
C026
0.0047μF
R-YL
3
R-YL CLAMP
R-YL DETECTION
PULSE SEPARATOR
+6V
R073
1.2K
9
+2.5V
R072
15
R059
220
C025
0.047μF
+1.8V
2
BFP CLAMP
REFERENCE DETECTION
R-YL BALANCE MODULATOR
10
C037
680pF
R060
6.2K
C027
0.047μF
CHROMA CLIP/ SUPPRESS
12
CHROMINANCE
B-YL
4
B-YL CLAMP
B-YL DETECTION
B-YL BALANCE MODULATOR
BFP
21
20
19
18
16
14
C033
680pF
C035
680pF
W. BL
B-YL
DETECT OUT
REFERENCE
R-YL
SC 90°
SC 0°
CHROMA CLIP

Fig. 4-7-1 Chroma Encoding Circuit

4-7-3 Chroma Clip/Suppress Circuit

Outline

This circuit contains the high Y level chroma clip circuit and low level chroma suppress circuit.

The high Y level chroma clip circuit clips the green color which results when an excessively bright object is shot with the camera. (Refer to 4-6-7 Chroma Clip Signal Circuit for details.)

The low level chroma suppression circuit enhances color reproduction in low luminance condition by improving the white balance, when the color of the object is faint.

Details

The chrominance signal with the burst Ⓐ is supplied to the chroma clip/suppress circuit from the R-YL and B-YL balance modulator circuits. The chroma clip signal Ⓑ which is made in the chroma clip signal circuit in IC003 is supplied through pin 10 of IC004 to the chroma clip/suppress circuit where the chrominance signal corresponding to the excessive bright object is clipped (Ⓒ) and does not reach the NTSC output. The chroma clip signal also suppresses the chrominance signal around the unnatural green color.

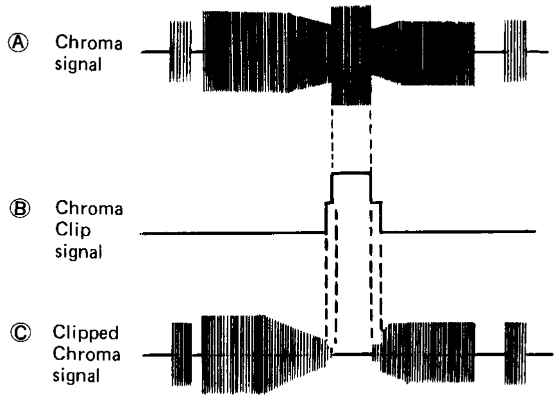


Fig. 4-7-2 Chroma Clip

The DC voltage obtained by dividing the voltage between +6V and +2.5V with R073 and R072, and fed to the chroma clip/suppress circuit through pin 9 of IC004 determines the low suppression level of chroma signal. This DC voltage is applied to the chroma clip/suppress circuit and clips the low chrominance level.

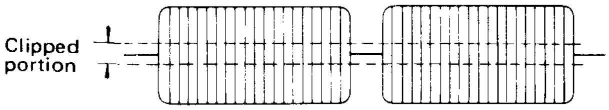


Fig. 4-7-3 Chroma Suppress

4-7-4 White Set Detection Circuit

Outline

This circuit receives the R-YL, B-YL and reference DC voltage from the respective clamp circuits and converts them to the DC voltages. The detected DC voltages are sent to the white balance setting circuit.

Details

The clamped R-YL, the clamped B-YL and the clamped burst flag pulse (BFP) are respectively fed to the detection circuits and their center portions are gated by the wide blanking (W.BL) pulse supplied through pin 21 of IC004 in order to set the white balance with the signal corresponding to the center image. The clamped burst flag pulse is gated by the W.BL pulse, the burst flag pulse is removed and only the clamp DC voltage is detected as a reference DC voltage. The gated signals are converted into the DC voltage in the detection circuit and fed through pins 18, 19 and 20 of IC004 to the white balance setting circuit.

4-8 Burst Generator Circuit

Outline

This circuit gates the burst signal from the mixed signal of the chrominance and burst signals supplied from the chroma encoding circuit and phase-shifted burst is generated. The burst signal is fed to the NTSC processing circuit together with the sync signal.

Details

The mixed signal Ⓐ of chrominance and burst signal is fed from pin 12 of IC004 to the collector of burst gate Q005. The burst flag pulse (BFP) Ⓑ is fed from the pulse generator circuit to the base of Q005 to gate the burst signal. The gated burst signal Ⓒ at the collector of Q005 is then fed to phase shifter Q006 through VR009 (BURST LEVEL). The phase-shifted burst signal at the junction point of CT002 (BURST PHASE) and R081 is then mixed with the sync pulse Ⓓ comes from the pulse generator circuit. The mixed signal Ⓔ is supplied to NTSC processing circuit to form a composite NTSC signal.

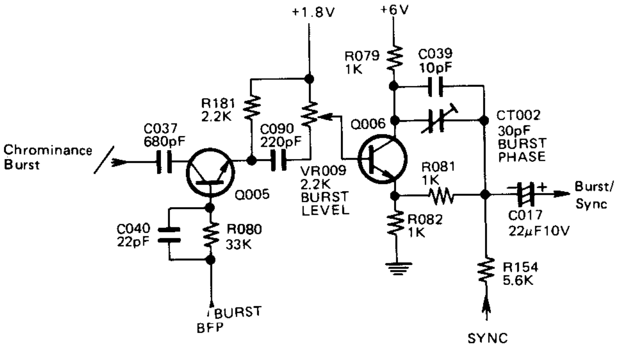

+1.8V
+6V
R079
1K
C039
10pF
R181
2.2K
C037
680pF
C090
220pF
Q006
CT002
30pF
BURST
PHASE
Chrominance
Burst
VR009
2.2K
BURST
LEVEL
R081
1K
Q005
Burst/
Sync
C040
22pF
R080
33K
R082
1K
C017
22μF10V
R154
5.6K
BURST
BFP
SYNC

Fig. 4-8-1 Burst Generator Circuit

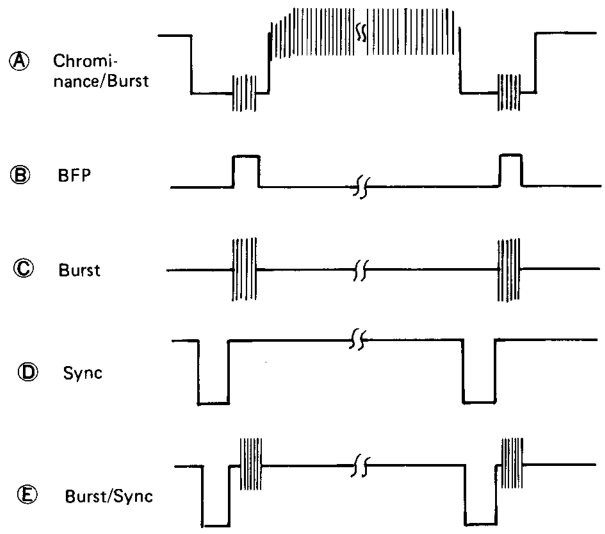

Ⓐ Chrominance/Burst
Ⓑ BFP
Ⓒ Burst
Ⓓ Sync
Ⓔ Burst/Sync

Fig. 4-8-2 Burst Signal

4-9 1/2 fH Beat Prevention Circuit

Outline

In this color camera, the red(R) and blue(B) signals are obtained from the modulated R and B signals of odd-number scanning lines and the modulated R and B signals of even-number scanning lines either by adding or subtracting them.

It should also be noted that the levels of the R and B signals on odd-numbered and even-numbered scanning lines are not equal due to the non-linear vertical scanning and decoding process necessary for separation. (Ⓐ and Ⓑ)

Therefore, the chroma signal level obtained after modulation of R-YL and B-YL signals differs between the even-numbered lines and the odd-numbered lines, causing a level difference Ⓒ

Thus, this level difference appears on the monitor as an 1/2fH beat (i.e., seen as line pairing of chroma). To remove this beat, the chroma signal level of each horizontal line is averaged by adding a delayed 1H chroma signal Ⓓ and an un-delayed chroma signal Ⓒ to make a chroma signal Ⓔ without beat or differences.

Details

The chrominance signal Ⓒ from pin 12 of IC004 is supplied to 1H delay line DL002 through C037. The 1H-delayed chroma signal Ⓓ runs through R191 is mixed with the non-delayed chroma signal Ⓒ which is fed through R076.

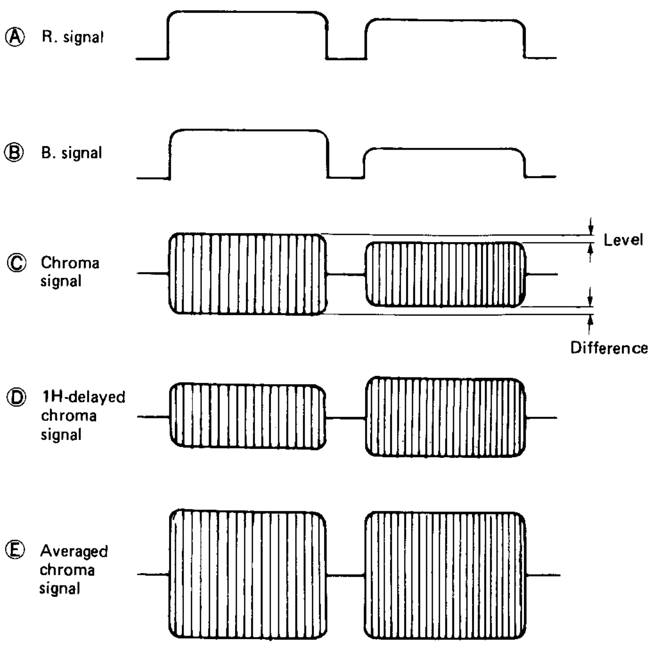

Ⓐ R. signal
Ⓑ B. signal
Ⓒ Chroma signal
Level
Difference
Ⓓ 1H-delayed chroma signal
Ⓔ Averaged chroma signal

Fig. 4-9-1 1/2 fH Beat Prevention

After its level is set by VR008 (CHROMA GAIN), the averaged chroma signal Ⓔ is fed to the NTSC signal processing circuit through pin 22 of IC002.

Q004 removes the burst signal from the mixing signal of the chrominance and burst signals. The positive preblanking (pre BL) pulse is fed to the base of Q004 and Q004 turns ON during the blanking period of chrominance signal. In this way, the burst signal is removed. The burst signal is mixed in the NTSC signal processing circuit to form the NTSC signal.

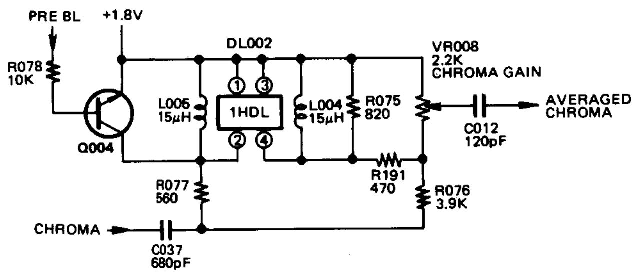

PRE BL
+1.8V
R078
10K
Q004
DL002
L005
15μH
1HDL
①
③
②
④
L004
15μH
R075
820
VR008
2.2K
CHROMA GAIN
AVERAGED
CHROMA
C012
120pF
R191
470
R077
560
R076
3.9K
CHROMA
C037
680pF

Fig. 4-9-2 1/2 fH Beat Prevention Circuit

4-10 NTSC Signal Processing Circuit

Outline

In this circuit, the chrominance signal, the luminance signal, the blanking signal, the burst signal and the sync signal are mixed to produce a composite NTSC signal. The negative colored NTSC signal is also made in this circuit. The NTSC signal is applied to the portable VCR, or a desk-top type VCR through the power supply.

Details

The chrominance signal is supplied from the 1/2fH beat prevention circuit to the chroma gain control circuit inside IC002 through pin 22. The positive vertical edge signal from the vertical edge signal generator and the chroma clip signal from the chroma clip signal circuit are mixed together through R047 and R048 and fed via pin 20 to the chroma gain control circuit, where these signals controls the chrominance signal level.

In the chroma clip/suppress circuit previously explained, the green color which results when the excessively bright object is shot with the camera is clipped by the chroma clip signal. (Refer for the detail to 4-7-3 Chroma Clip/-Suppress Circuit.) The chroma clip signal supplied to the chroma gain control circuit minimizes the remaining chrominance signal corresponding to the excessively bright object.

The vertical transient spurious correction circuit previously described minimizes the unnatural color appears at the vertical edge of object. (Refer for the detail to 4-6-2 Vertical Transient Spurious Correction Circuit.) The positive vertical edge signal supplied to the chroma gain control circuit decreases the chrominance signal corresponding to the unnatural color at the vertical edge.

The chrominance signal Ⓐ undergoes the chroma gain control is fed to the Y/chroma/aperture mixing circuit inside IC002. The mixed signal Ⓑ of the luminance (YH) signal and the vertical(V) edge signal is fed to the mixing circuit. The horizontal aperture signal from the horizontal(H) aperture generator circuit and the H.aperture suppress circuit to the mixing circuit through pin 4 of IC002. In the mixing circuit, these signals are mixed. The mixed signal Ⓒ is supplied to the fade circuit where its signal level is controlled by the fade control signal supplied from the fade/recording control circuit through pin 24 of IC002. (Refer for the details to 4-14 fade/-recording control circuit.) The mixed signal is then fed through the negative/positive select circuit to the character mix circuit where the characters/graphics signals such as calendar/date superimposed onto the NTSC signal is mixed. The characters/graphics signals are sent from the Deflection board through pin 15 of IC002. The mixed signal is forwarded through pins 6 and 7 of IC002 to the clamp circuit, where the blanking level of the mixed signal is clamped by the clamp pulse-2 (CP2) supplied from the pulse separator inside IC002. The clamped signal is then sent to the BL mix/high clip/low clip circuit, where it is mixed with the blanking(BL) pulse (Ⓓ). The high clip circuit clips the signal exceeds 120 IRE unit (8.5V) and the low clip circuit clips the low level portion of mixed signal Ⓓ for setting the pedestal level (Ⓔ). The mixed signal Ⓔ of chrominance and luminance signals which undergoes the high and low clip is mixed with the mixing signal Ⓕ of sync and burst signal in the NTSC output circuit forming a composite NTSC signal Ⓖ.

The NTSC signal at pin 13 of IC002 is supplied to the VCR through R043, C018 and terminal No. 5 of CN006. The NTSC signal is also supplied to 3.58MHz trap CF004 where the chrominance signal is removed and the luminance signal remains. The luminance signal is then fed to the electronic viewfinder through terminal No. 8 of flat cable JC and the Deflection board.

When the camera is used in the normal condition, the high level of nega/posi control signal is fed from the Micro processor board through terminal No. 5 of flat cable JD and pin 21 of IC002 to the negative/positive select circuit for selecting the positive position and the normal picture is observed.

If the nega/posi select switch on the side of camera is pressed, the nega/posi control signal is converted from the high level to the low level and the negative position is selected. Therefore when the camera is used for shooting the negative film, the normal picture can be observed by pressing the nega/posi select switch on the side. However, since the color reproduction characteristic of negative film is different, the chrominance signal amplitude corresponding to the high Y level is extremely high. Q002 suppresses the chrominance signal when the camera is used in the negative position. In the negative position, the low level of nega/posi control signal is fed to the base of Q002 turning off Q002. When the Q002 is turned OFF, the YL signal obtained at pin 17 of IC002 is fed through R186, R185 and pin 20 of IC002 to the chroma gain control circuit where the YL signal suppresses the chrominance signal corresponding to the high Y level. In the positive position, the high level is sent to the base of Q002 and Q002 is turned ON. Therefore, the YL signal is not fed to the chroma gain control circuit.

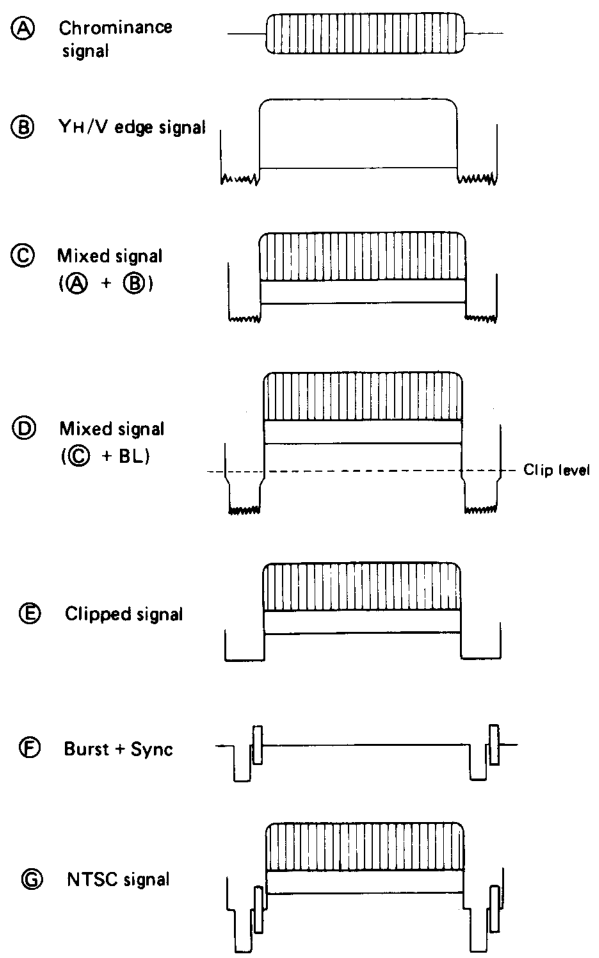

Ⓐ Chrominance signal
Ⓑ YH/V edge signal
Ⓒ Mixed signal (Ⓐ + Ⓑ)
Ⓓ Mixed signal (Ⓒ + BL)
Clip level
Ⓔ Clipped signal
Ⓕ Burst + Sync
Ⓖ NTSC signal

Fig. 4-10-2 NTSC Signal

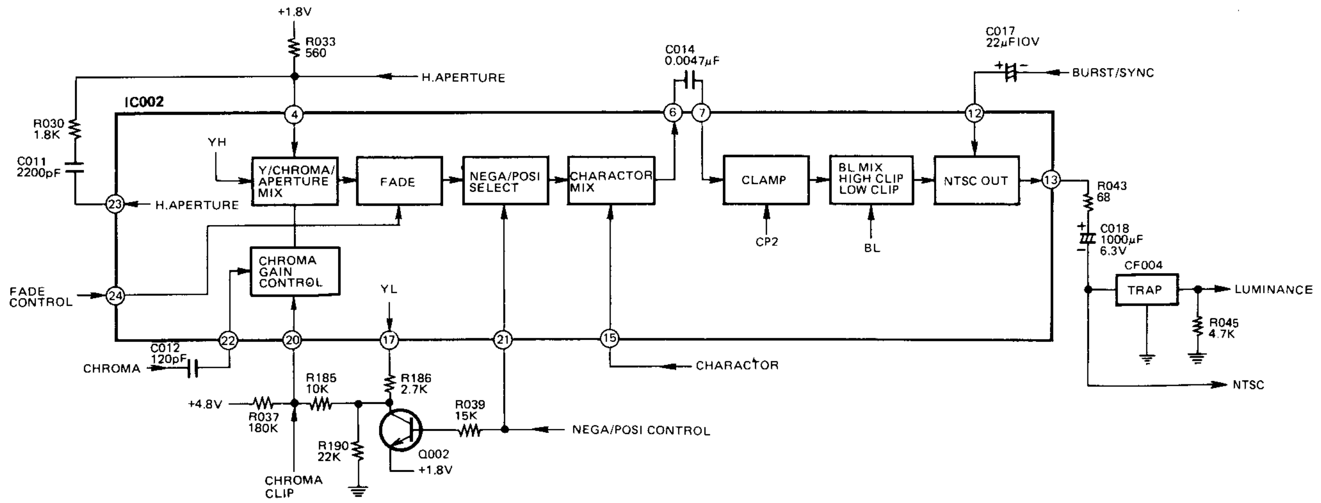

+1.8V
R033
560
H.APERTURE
IC002
R030
1.8K
C011
2200pF
YH
Y/CHROMA/
APERTURE
MIX
FADE
NEGA/POSI
SELECT
CHARACTOR
MIX
H.APERTURE
CHROMA
GAIN
CONTROL
FADE
CONTROL
YL
C012
120pF
CHROMA
R185
10K
R186
2.7K
+4.8V
R037
180K
R190
22K
Q002
+1.8V
R039
15K
NEGA/POSI CONTROL
CHROMA
CLIP
CHARACTOR
C014
0.0047μF
CLAMP
CP2
BL MIX
HIGH CLIP
LOW CLIP
BL
NTSC OUT
C017
22μF10V
BURST/SYNC
R043
68
C018
1000μF
6.3V
CF004
TRAP
LUMINANCE
R045
4.7K
NTSC
4
6
7
12
13
23
24
22
20
17
21
15

Fig. 4-10-1 NTSC Signal Processing Circuit

4-11 Playback Detect Circuit

Outline

This circuit detects the recording or playback mode of the portable VCR and sends the detected information to the Micro processor board and the playback control signal is fed back to this circuit. When the portable VCR is set into the recording mode, the playback control signal sets the camera to supply the NTSC output signal to the viewfinder and the portable VCR for recording. When the portable VCR is set into the playback mode, the playback control signal shuts off the camera function and supplies the playback signal from VCR to the viewfinder.

Details

When the portable VCR is set into the recording mode, no DC voltage is applied through R044 and terminal No. 11 of the flat cable JD to the Micro processor board. The low level obtained in the Micro processor board is fed back through terminal No. 3 of JD to the anode of D003 and D003 turns OFF. Therefore the NTSC output circuit works properly and sends the NTSC signal to the viewfinder and the portable VCR for recording. When the portable VCR is set into the playback mode, the playback signal which rides on top of +6V DC is supplied from the VCR through terminal No. 5 of CN006. The playback signal is removed by C016 and the remaining +6V DC is fed to the Micro processor board. The low level generated in the Micro processor board is converted to the high level by the +6V DC and fed back to the anode of D003 turning ON D003. The high level is supplied to the NTSC output circuit to shut it OFF. In this way the NTSC signal is not generated in the camera and only playback signal from the portable VCR is supplied to the viewfinder through trap CF004.

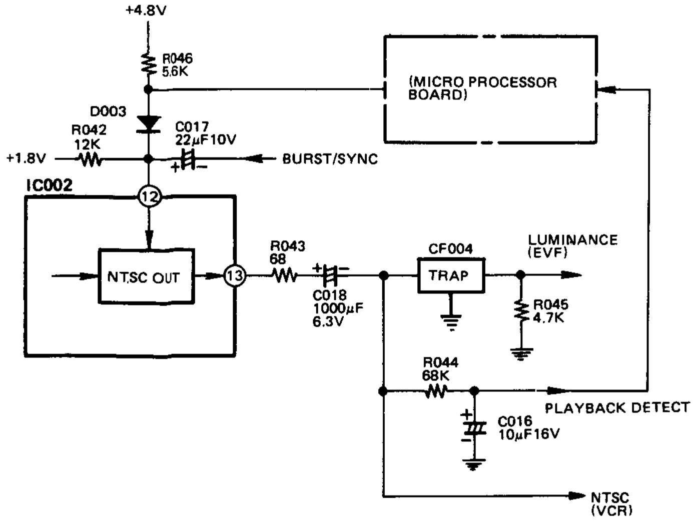

+4.8V
R046 5.6K
(MICRO PROCESSOR BOARD)
D003
R042 12K
C017 22μF10V
+1.8V
BURST/SYNC
IC002
12
NTSC OUT
13
R043 68
C018 1000μF 6.3V
CF004
TRAP
LUMINANCE (EVF)
R045 4.7K
R044 68K
C016 10μF16V
PLAYBACK DETECT
NTSC (VCR)

Fig. 4-11-1 Playback Detect Circuit

4-12 White Balance Setting Circuit

Outline

This circuit automatically sets the white balance of picture by controlling the amplitude of red and blue signals respectively. (Proper white balance or color balance means that the camera will reproduce a white object in the picture as white.)

Since the scene illumination contributes to color in balance, a diffusion filter is placed between the lens and the pick-up tube when the white set switch is placed in the SET position. Therefore, white setting uses the same light as will be used later.

When the SET position is chosen, the automatic cycle in the camera increases or decreases R and B signals in step and stops when each of these levels is equal to the green (Y_L) level. At this point, the R-Y_L and B-Y_L signals are both 0(zero), the picture is white and white balance has been achieved.

This is indicated by the graphics displayed in the viewfinder. The flashing graphics WHITE OK will be displayed after the power switch is turned ON and while the white balance is being set. The graphics WHITE OK are displayed when the automatic white balance processed is finished.

Details

When the power switch is turned ON, the positive reset pulse is generated in the Micro processor board. This reset pulse is fed through terminal No. 17 of the flat cable JD and pin 13 of IC009 to the reset circuit and IC009 is reset. THe DC voltage made by the resetting and obtained at pin 10 and pin 2 of IC009 are supplied to the gain control circuit in the R-Y_L and B-Y_L signal circuits through R132/pin 19 of IC005 and R134/pin 6 to set the initial gain of R and B signals respectively. As a result, the R signal and B signal levels are set and camera will produce average white balance for 3200°K illumination when the power is first applied.

At this time, the high is fed from the AWC warning circuit inside IC009 to the Micro processor board through pin 21 of IC009 and terminal No. 16 of flat cable JD for displaying the flashing graphics WHITE on the viewfinder. When the graphics are displayed, the white balance should be set by placing the white set switch SW001 on the side of camera to the SET position while aiming the camera at the white object or white paper.

When the white set switch SW001 is placed to the set position, pin 16 of IC009 is grounded, the 15Hz clock pulse is fed from the counter control circuit to the 6-bit up/down counters and the counters start counting up or down depending on the levels at pin 14 and pin 12 of IC009. (The 15Hz clock pulse is made by frequency-dividing the 60Hz vertical scanning start (Vs) pulse in the counter control circuit.) As the counters count up or down the digital/analog (D/A) converter produce staircase signals. The voltage levels of these D/A converter will set the R and B gain.

These DC voltages are sent to the gain control circuit in IC005 and control the R and B signal levels which was initially set for 3200°K illumination. As the increasing or decreasing voltages made by the stairsteps raise the gain of R and B channels, the levels of R-Y_L and B-Y_L signal increase or decrease at pins 14 and 11 of IC005.

To determine for the up/down counters counting up or down, an Op-amp for each channel (IC010 pins 5, 6, 7 for red, pins 1, 2, 3 for blue) compares the detected signal levels (DC) which appear at IC004 (pin 18 : R-Y_L detected DC, pin 20 : B-Y_L detected DC, pin 19 : reference detected DC).

The outputs of comparison at pin 7 and pin 1 of IC010 are sent to the up/down counters through pins 14 and 12 of IC009.

The output of comparator at pin 7 is high when the R signal level is below the Y_L signal (The R-Y_L detected DC level is below the reference detected DC level.), and the counter starts counting up.

The increased DC voltage from the D/A converter is fed to the red gain control circuit to increase the red signal level.

When either the R signal just exceeds the Y_L signal, the comparator switches its output to low and the counter starts counting down. The decreased DC voltage reduces the R signal level. This loop works until the R signal level is equal to the Y_L signal. The B channel works in a similar fashion.

The counters stop counting automatically about 5 seconds after the white set switch SW001 is placed to the SET position and white balance has been achieved. At the same time, the high from the AWC warning circuit is switched to low and the flashing graphics WHITE goes OFF from the viewfinder or the graphics WHITE OK are displayed.

Since the diffusion filter has itself an inherent color filtering effect, the white balance shifts slightly when the white setting is accomplished and diffusion filter is removed. When in the white set mode, the gains of gain control circuits for the R and B signal are slightly shifted by grounding the R130 and R131 and the white balance is set. When the white setting is accomplished and the white set switch is placed in the normal mode the gains are returned to the previous mode for an almost exact match.

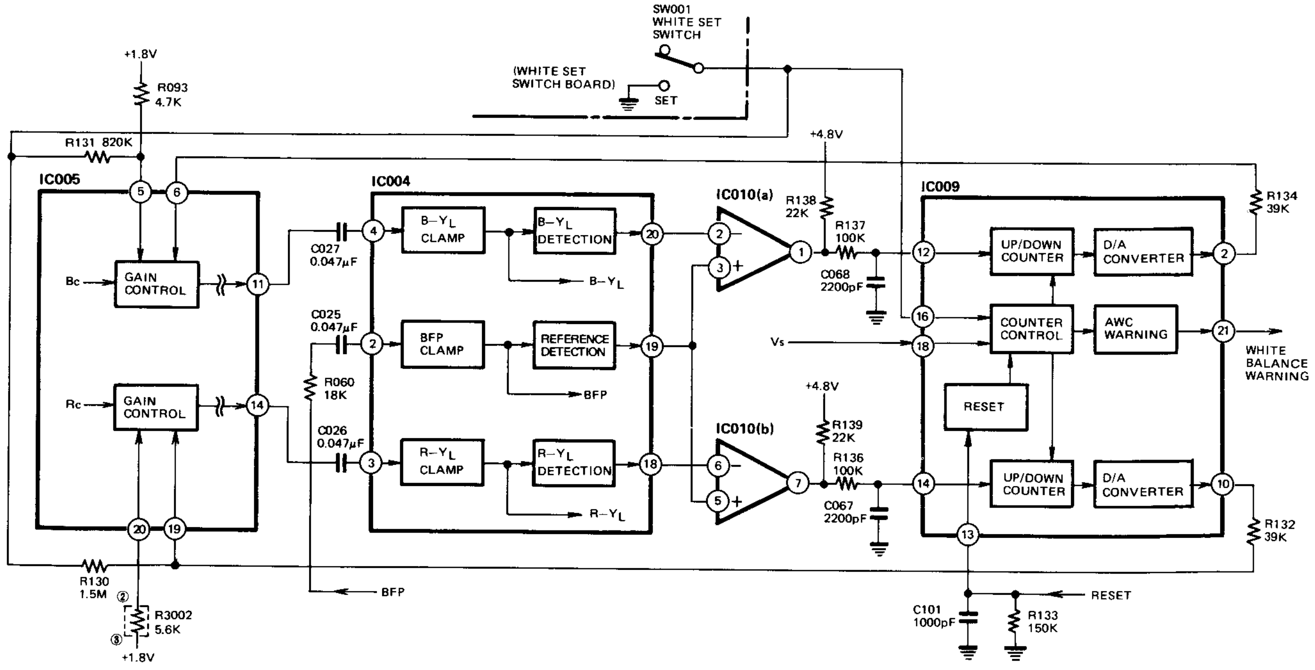

SW001 WHITE SET SWITCH
(WHITE SET SWITCH BOARD)
SET
+1.8V
R093 4.7K
R131 820K
IC005
5
6
Bc
GAIN CONTROL
11
Rc
GAIN CONTROL
14
20
19
R130 1.5M
②
R3002 5.6K
③
+1.8V
IC004
C027 0.047μF
4
B-YL CLAMP
B-YL DETECTION
20
B-YL
C025 0.047μF
2
BFP CLAMP
REFERENCE DETECTION
19
BFP
R060 18K
C026 0.047μF
3
R-YL CLAMP
R-YL DETECTION
18
R-YL
BFP
IC010(a)
2
3
1
R138 22K
R137 100K
C068 2200pF
+4.8V
Vs
IC010(b)
6
5
7
+4.8V
R139 22K
R136 100K
C067 2200pF
IC009
12
UP/DOWN COUNTER
D/A CONVERTER
2
R134 39K
16
18
COUNTER CONTROL
AWC WARNING
21
WHITE BALANCE WARNING
RESET
14
UP/DOWN COUNTER
D/A CONVERTER
10
R132 39K
13
RESET
C101 1000pF
R133 150K

Fig. 4-12-1 White Balance Setting Circuit

4-13 Correction Signal Generator Circuit

Outline

This circuit generates the bias light shading correction signal, the dynamic focus correction signal and the shading correction signal corresponding to the characteristics of the pick-up tube. These signals are supplied to the respective correction circuit.

. Bias light shading correction signal

The light intensity by the bias light LEDs is not uniform along the entire target surface. Therefore, the bias current which is produced by the pick-up is not uniform, but has a shading Ⓐ

As described in the section on the principles of single carrier frequency multiplexing, the red and blue signals are obtained by detecting the modulated signals from the preamplifier output using a band pass filter. Therefore, the red and blue signals are free from bias light shading.

However, the luminance signal is obtained by removing the modulated signal using a trap circuit. Therefore, the luminance signal receives undesirable bias light shading. The bias light shading correction which contains the horizontal sawtooth and parabola signals Ⓑ to the signal processing circuit to mix it to the preamplifier output signal for correcting color shading at low illumination levels (Ⓒ).

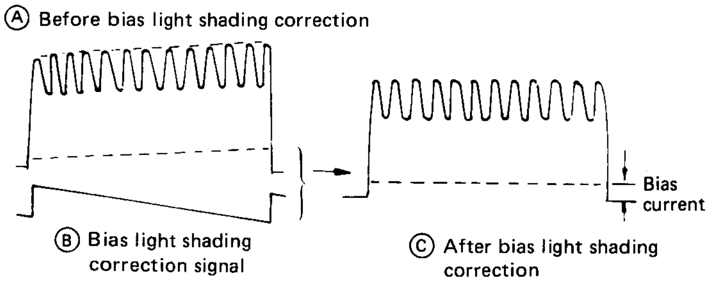

Ⓐ Before bias light shading correction
Bias current
Ⓑ Bias light shading correction signal
Ⓒ After bias light shading correction

Fig. 4-13-1 Bias Light Shading Correction

. Dynamic focus correction signal

Generally, the focus voltage which brings the beam in focus in the center part of the pick-up tube is different in level from the voltage which brings the edge portions of the pick-up tube into best focus so that the modulation depth for the center part and the edge portions of the pick-up tube differ. When the camera is directed at an evenly illuminated white object, the red and blue signals modulated at 3.58MHz do not have a uniform level, and as a result, a color shading appears (Ⓓ).

The dynamic focus correction signal which contains the horizontal and vertical sawtooth and parabola signals is supplied to the pick-up tube's focus electrode (grid-4) together with the DC focus voltage to focus the electron beam along the entire scanning area for correcting unevenness of modulation depth (Ⓔ).

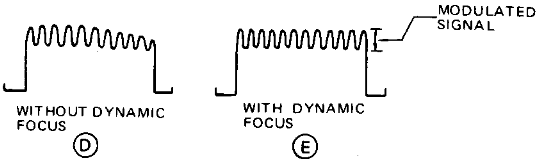


Fig. 4-13-2 Dynamic Focus Correction

. Shading correction signal

Even when dynamic focus correction is applied to grid-4 of pick-up tube, the non-uniformity of modulation due to uneven focus on the target can not be completely eliminated.

Modulation un-uniformity also occurs due to non-uniform structure in the photoconductive layer of the pick-up tube (manufacture tolerance).

The shading correction signal which contains the horizontal and vertical sawtooth and parabola signals is fed to the shading correction circuit to compensate for residual picture shading (Refer to 4-6-3 Shading Correction Circuit).

Details

The bias light shading correction signal of horizontal sawtooth/parabola signals from shading correction circuit board is fed to pin 3 of amplifier IC008(a). The amplified bias light shading correction signal is then fed to the signal processing circuit and mixed through R002 with the preamplifier output signal for correcting the color shading at low light levels.

The horizontal and vertical dynamic focus correction signals of horizontal sawtooth/parabola and vertical sawtooth/parabola signals from shading correction circuit board are fed to pin 6 of amplifier IC008(b). The amplified dynamic focus correction signal is sent to the Deflection board through terminal No. 10 of flat cable JB and mixed with the focus DC voltage. The mixed signal is fed to the grid-4 of pick-up tube to focus the electron beam along the entire scanning area and the unevenness of modulation is corrected.

The horizontal and vertical shading correction signals of horizontal sawtooth/parabola and vertical sawtooth-/parabola signals from shading correction circuit board for red signal are fed to pin 22 of IC005 for correcting the red shading. Similarly the horizontal and vertical shading correction signals are supplied to pin 3 of IC005 for correcting the blue shading.

4-14 VCR Remote Control/Fade Control Circuit

This circuit consists of the VCR remote control circuit and the fade control circuit.

4-14-1 VCR Remote Control Circuit

Outline

This circuit generates VCR start/stop (pause) control signal. When the VCR is set to the recording mode, the VCR is started by a high potential from this circuit. If a low potential is sent to the VCR, it stops (pauses). This circuit also has the VCR compatibility switch for other VCR which is started by a low potential and stopped by a high potential.

Details

When the VCR compatibility switch SW003 is set in the ⊕ (normal) position and the VCR is set in the recording mode if the power switch is turned ON, the potential at pin 15 and pin 17 of IC006 are set to low and high respectively by the power reset circuit inside IC006. The low at pin 15 is fed through terminal No. 4 of CN006 and terminal No. 6 of VCR connector CN110 to the VCR to stop (pause) it.
At the same time, the high at pin 17 is fed to the Micro processor board and the graphics REC is not displayed in the viewfinder.
When the non-lock type VCR start/stop switch SW701 is depressed (refer to "1ST TRIGGER" in Fig. 4-14-2), the negative trigger pulse is generated. It is fed to the fade/rec control circuit and the potential at pin 15 and pin 17 is reversed. The high at pin 15 is fed to the VCR to start recording.
At the same time, the low at pin 17 is sent to the Micro processor board and the graphics REC is displayed in the viewfinder.
When the subsequent trigger pulse is sent to the fade/rec control circuit by depressing SW701 again (refer to "2ND TRIGGER" in Fig. 4-14-2), the potential at pin 15 and pin 17 is inverted. As a result, the VCR is stopped and the REC graphics go OFF.
The VCR compatibility switch SW003 inverts the potential of VCR recording control signal at pin 16 of IC006 for other VCR which starts with low potential and stops with high potential.
When the portable VCR is set to the playback mode, an inhibit signal (high level) from the VCR is supplied to the base of Q003 to turn it ON setting the potential at pin 7 of IC006 to low. The fade/rec control circuit is reset by the low level at pin 7 and the potential at pin 15 and pin 17 are forced low and high respectively. In this state, even if another trigger pulse is sent to the fade/rec control circuit by depressing SW101, the fade/rec control circuit remains set. Therefore, the REC graphics are not displayed in the viewfinder. This condition is maintained until the playback mode is released and set to the recording mode again.

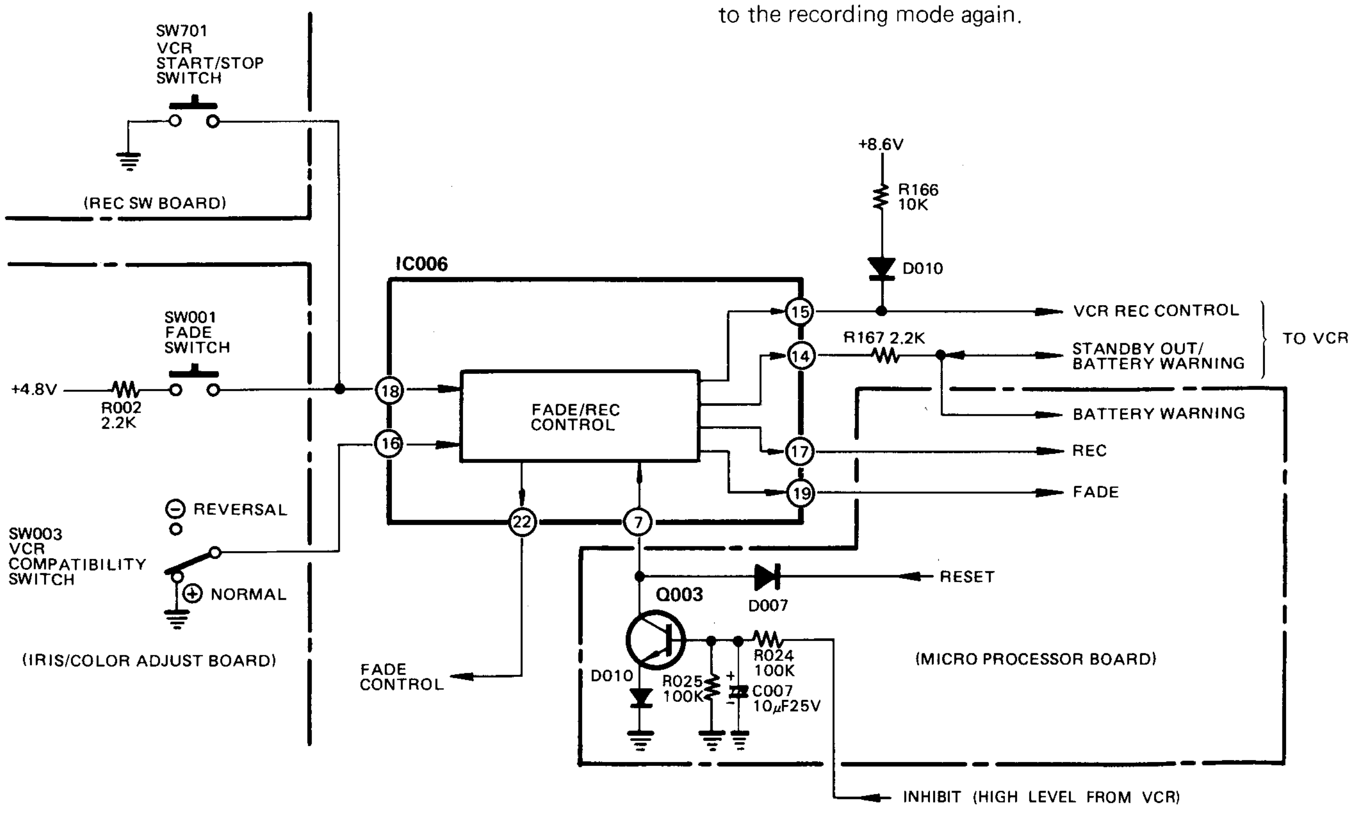

SW701
VCR
START/STOP
SWITCH
(REC SW BOARD)
SW001
FADE
SWITCH
+4.8V
R002
2.2K
⊖ REVERSAL
SW003
VCR
COMPATIBILITY
SWITCH
⊕ NORMAL
(IRIS/COLOR ADJUST BOARD)
IC006
FADE/REC
CONTROL
18
16
22
7
15
14
17
19
FADE
CONTROL
+8.6V
R166
10K
D010
VCR REC CONTROL
R167 2.2K
STANDBY OUT/
BATTERY WARNING
TO VCR
BATTERY WARNING
REC
FADE
RESET
Q003
D007
R024
100K
D010
R025
100K
C007
10μF25V
(MICRO PROCESSOR BOARD)
INHIBIT (HIGH LEVEL FROM VCR)

Fig. 4-14-1 VCR Remote Control Circuit

When the standby switch on the rear of the camera is set to the standby mode, the low potential is fed to the cathode of D007 from the Micro processor board setting the potential at pin 7 to low. The fade/rec control circuit is reset by the low at pin 7 and the potential at pin 15 and pin 17 are forced low and high as in the case of playback mode. The condition is maintained until the standby switch is reset to the ON position.

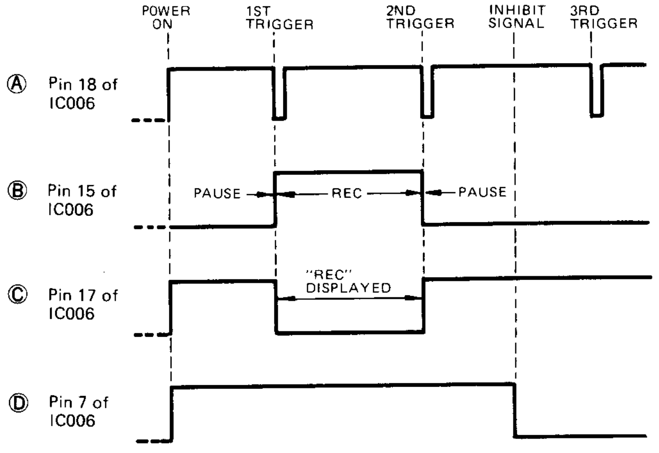

POWER ON
1ST TRIGGER
2ND TRIGGER
INHIBIT SIGNAL
3RD TRIGGER
Ⓐ Pin 18 of IC006
Ⓑ Pin 15 of IC006
PAUSE
REC
PAUSE
Ⓒ Pin 17 of IC006
"REC" DISPLAYED
Ⓓ Pin 7 of IC006

Fig. 4-14-2 VCR Remote Control Circuit

4-14-2 Fade Control Circuit

Outline

This circuit generates the fade control signal and sends it to the NTSC signal processing circuit to control the video fade-in/out effects.

When the VCR is in recording mode, if the VCR start-/stop switch is depressed after pressing the fade switch, the fade-out effect is obtained and the VCR pauses, then the picture reappears.

If the VCR is in pause, depressing the VCR start/stop switch after pressing the fade switch, the video will fade out, the VCR starts recording and the video fades in again.

If the VCR start/stop switch is depressed without pressing the fade switch, no fade effect occurs and the VCR is remote-controlled as described in VCR remote control circuit.

Details

- **Fade-in effect**

When the momentary fade switch SW001 is depressed (Ⓔ, 1ST TRIGGER), the DC level at pin 18 of IC006 becomes high. This high level intiates the fade/rec control circuit in IC006. This trigger signal Ⓔ changes the potential at pin 19 of IC006 from high to low (Ⓙ). The low level is fed to the Micro processor board and the graphics Ⓕ is displayed in the viewfinder. Then when the VCR start/stop switch SW701 is depressed (Ⓕ , 1ST TRIGGER), pin 18 of IC006 goes low and the DC level at pin 22 starts increasing gradually (Ⓗ).

After about few seconds the potential at pin 15 becomes high (Ⓛ) and the VCR starts recording. The potential at pin 17 of IC006 conversely goes low (Ⓚ) and it is fed to the Micro processor board to display the graphics REC in the viewfinder. Simultaneously the DC level at pin 22 starts decreasing gradually. This DC level Ⓗ at pin 22 is fed to the fed control circuit in the NTSC signal processing circuit to control the NTSC signal level (Ⓘ). This means that the VCR start/stop switch is pressed, the NTSC signal is decreased gradually at first and then appears again gradually (fade-in effect) after recording starts. Therefore the recording proceeds as shown Ⓜ .

When the fade-in effect is completed, the potential at pin 19 is changed from low to high (Ⓙ) and the graphics Ⓕ goes OFF.

If the VCR start/stop switch SW701 is depressed independently after fade-in effect is accomplished (Ⓕ , 2ND and 3RD TRIGGER), the VCR can be controlled remotely as previously described in VCR remote control circuit.

If the fade switch SW001 is depressed again after it is initially pressed (Ⓔ, 3RD and 4TH TRIGGER), the initial setting for fade effect will be cancelled.

- **Fade-out effect**

As in the case of fade-in effect, if the VCR start/stop switch SW701 is depressed (Ⓕ , 4TH TRIGGER) after pressing the fade switch SW001 (Ⓔ , 2ND TRIGGER), the DC level at pin 22 of IC006 starts increasing gradually to fade-out the video. After few seconds, the potential at pin 15 changes from high to low and VCR stops (pauses) decreasing gradually. This DC level at pin 22 is fed to the fade control circuit to control the NTSC signal level.

When the VCR/start switch is pressed after depressing the fade switch, the picture disappears at first (fade-out effect), VCR pauses and then the picture appears again gradually for next recording.

When the VCR stops, both the graphics REC and Ⓕ disappears from the viewfinder.

When the portable VCR is set to the playback mode or the standby switch is set to the standby position, pin 7 of IC006 becomes low and the fade/rec control circuit is reset as described in 4-14-1 VCR Remote Control Circuit. Therefore the fade/rec control circuit is not controlled by depressing the VCR start/stop switch and the fade switch.

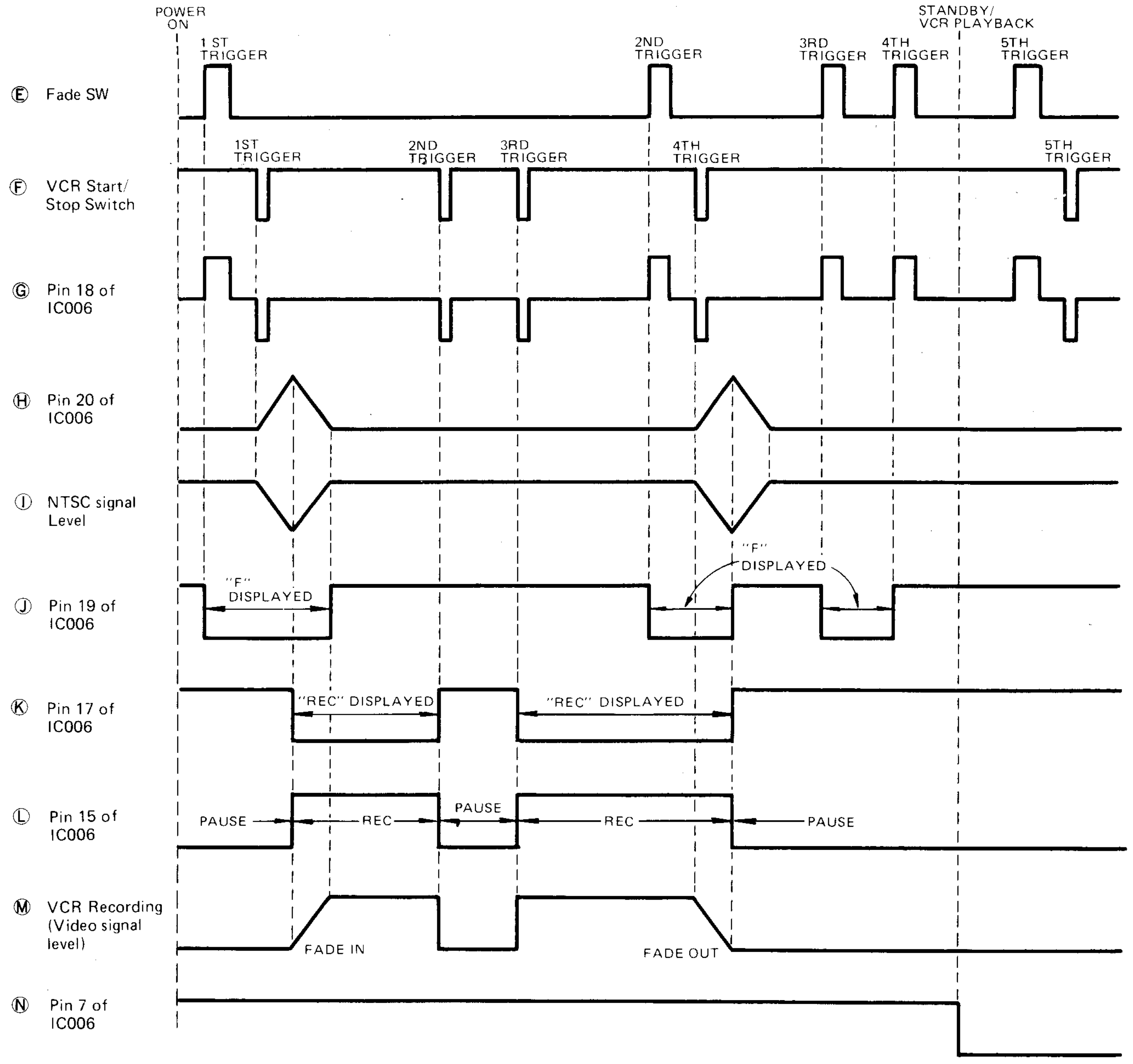

POWER ON
1 ST TRIGGER
2ND TRIGGER
3RD TRIGGER
4TH TRIGGER
STANDBY/ VCR PLAYBACK
5TH TRIGGER
Ⓔ Fade SW
1ST TRIGGER
2ND TRIGGER
3RD TRIGGER
4TH TRIGGER
5TH TRIGGER
Ⓕ VCR Start/ Stop Switch
Ⓖ Pin 18 of IC006
Ⓗ Pin 20 of IC006
Ⓘ NTSC signal Level
Ⓙ Pin 19 of IC006
"F" DISPLAYED
"F" DISPLAYED
Ⓚ Pin 17 of IC006
"REC" DISPLAYED
"REC" DISPLAYED
Ⓛ Pin 15 of IC006
PAUSE
REC
PAUSE
REC
PAUSE
Ⓜ VCR Recording (Video signal level)
FADE IN
FADE OUT
Ⓝ Pin 7 of IC006

Fig. 4-14-3 Fade Control Circuit

5 Micro Processor Board (YFVPKD0801JA)

The Micro Processor Board contains following circuits.

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Serial data transmission 46

5-1 Micro Processor 46

5-2 Input Interface 52

5-3 Character Generator 55

Outline

The micro processor Board consists of three(3) blocks as;

- Micro Processor
- Input Interface
- Character Generator

The micro processor, IC002 generates the programmed signals from the output ports of IC002 and receives these signals at the input ports of IC002 through the input interface circuits.

According to the input signals, the micro processor IC002 supplies the instructional signals to the character generator, IC003 and VCR for VCR remote control.

Serial data transmission

When the portable color video camera WV-4850 is used with portable video cassette recorder PV-5000, serial data transmission is performed between the both equipments through 10 pin connector.

The signals which are exchanged between the two equipments as shown in Fig. 5-1.

Pin	CAMERA	DIRECTION
1	Video OUT (REC) Video IN (P.B)	VCR ←→ CAMERA
2	GND	VCR → CAMERA
3	Serial Data	VCR ←→ CAMERA
4	Serial Clock	VCR → CAMERA
5	STANDBY Ⓗ	VCR ← CAMERA
6	CAMERA PAUSE Ⓛ	VCR ← CAMERA
7	Audio OUT	VCR ← CAMERA
8	GND	VCR → CAMERA
9	GND	VCR → CAMERA
10	+12V	VCR → CAMERA

Fig.5-1 10 pin Connector Signals

The serial clock signal is supplied to camera from VCR, which is shown as Fig. 5-2.

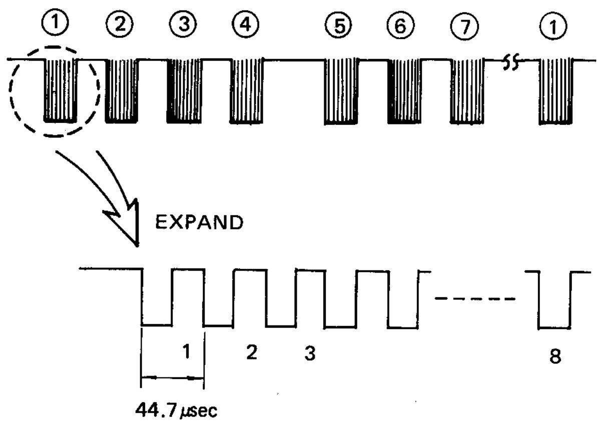


Fig. 5-2 Serial Clock

The serial clock has seven transmissions, and each transmission consists of 8 bit pulses.

During each transmission, the 8 bit serial data is exchanged as shown in Fig. 5-3.

No.	DATA	TRANSMISSION
1	CAMERA	→ VCR
2	Not used	
3	Not used	
4	Not used	
5	VCR	→ CAMERA
6	VCR	→ CAMERA
7	VCR	→ CAMERA

Fig. 5-3

The following serial data is supplied to the camera from the VCR as;

- Battery level
- Tape counter (Number, memory)

The following serial data is supplied to the VCR from the camera as;

- Tape counter (Reset, memory)
- Remote control of playback (PLAY, SLOW, CUE, REVIEW, INS)
- Standby signal
- REC/Playback selection signal

5-1 Micro Processor

The pin identifications and functions of the micro processor, IC002 and IC004 are described in the Table 5-1.

Table 5-1 Pin Identification and Functions of Micro Processor, IC002

Pin No.	Name	Description	"H" →	"L" →	"H" →	"L" →
1	C07	Playback OSC Control out.	Playback	Rec	Playback	Rec
2	C06	Rec Reset out	Rec	Playback	Rec	Playback
3	C05	Output for AI 0 (pin 5) of IC004				
4	C04	Not Used				
5	C03	Not Used				
6	C02	Playback Control out.	Playback	Rec	Playback	Rec
7	C01	Rec Control out	Rec	Playback	Rec	Playback
8	C00	"ADM" out	"H" : Direct Address Mode "L" : Address Increment Mode			
9	AI3	"REC" in	"START"	"PAUSE"	"START"	"PAUSE"
		"STANDBY" in	Hi Send out standby serial data signal to VCR.			
		"MARKSHIFT" in	MARKSHIFT	———	MARKSHIFT	———
		"NORMAL" in	NORMAL	———	———	———
		"MEMORY ON/OFF" in	MEMORY ON	———	MEMORY OFF	———
		"REVIEW" in	REVIEW	———	REVIEW	———
10	AI 2	"LOW LIGHT" in	LIGHT OK	LIGHT (ON & OFF)	LIGHT OK	LIGHT (ON & OFF)
		"AGC" in	AGC ON	AGC OFF	AGC ON	AGC OFF
		"P.B/REC" in	L : Send out REC serial data signal to VCR.			
		"CHECK" in	A pattern	———	B pattern	———
		"DATE SET" in	SET	———	SET	———
		"MEMORY RESET" in	0 : 0	———	———	———
		"CUE" in	CUE	PLAY	CUE	PLAY
11	AI 1	"WHITE BALANCE" in	WHITE OK	WHITE (ON & OFF)	WHITE OK	WHITE (ON & OFF)
		"FOCUS" in	AF ON	AF OFF	AF ON	AF OFF
		INDOOR/ OUTDOOR" in	INDOOR	OUTDOOR	INDOOR	OUTDOOR
		"DATE" in	DATE	———	DATE	———

Pin No.	Name	Description	"H" →	"L" →	"H" →	"L" →
11	AI 1	"MEMORY DELETE" in	REC TIMER	———	———	———
		"PLAY" in	PLAY	PAUSE	PLAY	PAUSE
12	AI 0	"FADE" in	F	———	F	———
		"PLAY BACK" DC in	REC	PLAY	REC	PLAY
		"NEG/POS" in	POS	———	NEG	———
		"SLOW" in	SLOW	PLAY	SLOW	PLAY
		"INSERT" in	INS (ON & OFF)	———	INS (ON & OFF)	———
13	BI 3	V. SYNC" in	V. SYNC signal supplied.			
14	BI 2	"BATTERY WARNING 2" in	Not functioned.			
15	BI 1	"BATTERY WARNING 1" in	Not functioned.			
16	NC	No Connection Inside.				
17	BI 0	Serial date in.				
18	EO 0	Scaning output for "REC" "LOW LIGHT" "WHITE BALANCE". "FADE" Output for "DA 4" (pin 6) of IC003.				
19	EO 1	Scaning output for "AGC", "FOCUS". Output for "DA 5" (pin 7) of IC003.				
20	EO 2	Output for "DA6" (pin 8) of IC003.				
21	EO 3	Output for "LD1" (pin 9) of IC003.				
22	TST	TEST in	Normally connect to Vss.			
23	$\overline{\text{RST}}$	RESET in				
24	$\overline{\text{CSLCT}}$	COUNTER SELECT in	H : SNSI will be SENS INPUT. L : SNSI will be COUNTER INPUT.			
25	SNS 0	SENS in	SERIAL CLOCK signal supplied.			
26	SNS 1	SENS in Input for "CO 3" (pin 16) of IC004.				
27	NC	No Connection Inside.				

Pin No.	Name	Description	"H" →	"L" →	"H" →	"L" →
28	DO 0	Scanning output for "MARKSHIFT", "DATE SET". Output for "DA 0" (pin 2) of IC003.				
29	DO 1	Output for "DA 1" (pin 1) of IC003.				
30	DO 2	Scanning output for "MEMORY ON/OFF", "MEMORY RESET", "MEMORY DELETE", "INSERT". Output for "DA 2" (pin 4) of IC003.				
31	DO 3	Scanning output for "REVIEW", "CUE", "PLAY", "SLOW". Output for "DA 3", (pin 5) of IC003.				
32	DO 4	Scanning output for "NORMAL", "CHECK", "DATE SET/DATE", "NEG/POS".				
33	DO 5	Scanning output for "STANDBY", "P.B/REC", "INDOOR/OUTDOOR", "P.B".				
34	DO 6	Scanning output for "AI 3" (pin 9) and "AI 2" (pin 2) of IC002.				
35	DO 7	SERIAL DATA output.				
36	Vcc	+4.8V in				
37	OSC	Oscillator in	1MHz clock pulse supplied.			
38	Vss	Connect to Ground.				
39	CO 11	INDICATOR CONTROL out	AIC close	AIC open	AIC close	AIC open
40	CO 10	Not used				
41	CO 9	NEGA/POSI CONTROL out	POS	NEG	POS	NEG
42	CO 8	Output for "AI 1" (pin 4) of IC004.				

Pin Idetification and Function of Micro Processer, IC004

Pin No.	Name	Description	
1	Vss	Connect to Ground.	
2	AI 3	V. SYNC in	V. SYNC signal supplied.
3	AI 2	INDOOR/OUTDOOR SWITCH in	
4	AI 1	Input for "CO 8" (pin 42) of IC002.	
5	AI 0	Input for "CO 5" (pin 3) of IC002.	
6	EO 0	Not used.	
7	EO 1	Output for DISPLAY SPLITTER of Q001.	
8	TST	TEST in	Connect to Ground.
9	$\overline{\text{RST}}$	RESET in	
10	SNS 0	SENS in	H. SYNC signal supplied.
11	Vcc	+4.8V in	
12	OSC	OSC in	1MHz clock pulse supplied.
13	EO 2	Not used.	
14	EO 3	Not used.	
15	EO 4	Not used.	
16	CO 3	Output for "SNSI" (pin 26) of IC002.	
17	CO 2	Output for AWC reset.	
18	CO 1	Output for "$\overline{\text{RST}}$" (pin 21) of IC002.	

The programmed signals (key scan pulse) are supplied from the output ports DO0 - DO5 and EO0 - EO1 to the input interface circuits.

Then, these programmed signals are supplied from the input interface circuits to the input port AI0 - AI3 through diodes, switches and transistors .... See chapter 5-2, Input Interface.

According to the programmed signals at the input port AI0 - AI3 and the signals at the input port BI0 - BI2, the micro processor identifies the instruction with the signal flow route at the input interface circuit and supplies the instructional signals (EO0 - EO3, DO0 - DO3) to the character generator.

The serial clock signal is supplied to pin 25, SNS0 of IC002 from VCR.

The frequency (1 MHz) of the clock pulse for the micro processor is oscillated by X001 and IC005 which is connected to pin 37 of IC002.

To prevent the error function of the micro processor in the instant of the power ON, the micro processor should be reset in delay.

The reset pulse generator, Q004 is used to delay resetting of the micro processor at the power ON and is shown in Fig. 5-1-1.

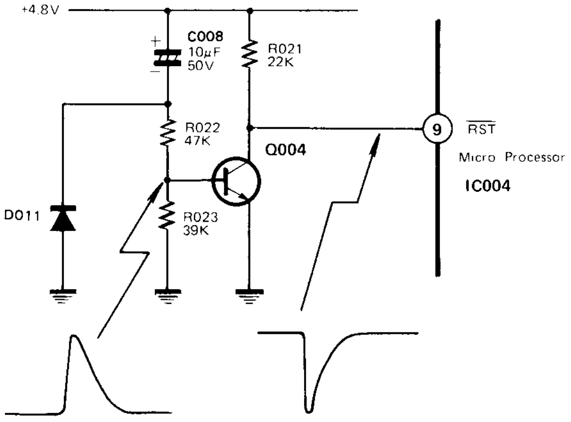


Fig. 5-1-1 Reset Pulse Generator

When the power is ON, C008 is started to charge with the time constant consisting of C008, R022 and R023, and the base voltage of Q004 is rising so that Q004 is ON and the collector voltage of Q004 is dropped and rising as shown in Fig. 5-1-1.

This pulse at the collector of Q004 is used to reset IC004 and supplied at pin 9 of IC004.

The EVF display splitter is shown in Fig. 5-1-2.

The output port EO1 of IC004 supplies the signal to the base of Q001 for splitting the EVF display graphics into upper portion and lower portion.

To split the EVF display, the vertical address counter of the character generator, IC003 is stopped at no graphic display area.

While the graphics is displayed, the LOW signal is supplied from pin 7, EO1 of IC004 to the base of Q001 so that Q001 is OFF and the H sync pulse is supplied from pin 9 of JC to pin 19 of IC003 so that the vertical address counter for EVF display is functioned.

While the graphics is not displayed, the HIGH signal is supplied from pin 7, EO1 of IC004 to the base of Q001 so that Q001 is ON and H sync pulse is not supplied from pin 9 of JC to pin 19 of IC003 by grounding through Q001 so that the vertical address counter for EVF display is not functioned.

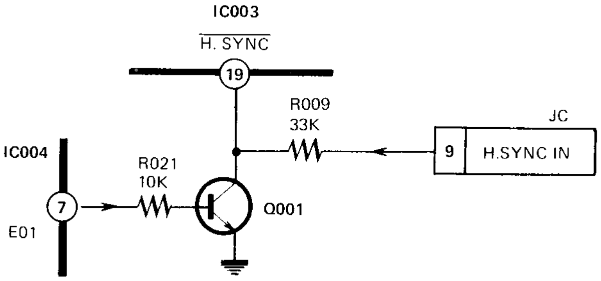


Fig. 5-1-2 Display Splitter

The detection of the standby mode is shown in Fig. 5-1-3.

When the camera is in the standby 1 and 2 mode, the +4.8V DC at pin 10 of flat cable JC becomes 0V and the base of Q006 becomes LOW so that Q006 is ON and the collector of Q006 becomes HIGH which is the level at pin 9, AI3 of IC002 for STANDBY mode. The Vcc, pin 12 of IC003 also becomes 0V so that IC003 is not functioned during the standby mode.

When the camera is in the normal mode, +4.8V DC at pin 10 of flat cable JC is supplied to pin 12, Vcc of IC003 so that IC003 is functioned and also supplied to the base of Q006 so that Q006 is OFF and the collector of Q006 becomes LOW. Therefore, pin 9, AI3 of IC002 become HIGH for the normal mode.

The level at the collector of Q006 is supplied to input port AI3 for identifying the condition of the camera as;

LOW Level :	NORMAL Mode
HIGH Level :	STANDBY Mode

When the camera is in the standby mode, IC003 is not functioned. The output of CO7 (pin 1) of IC002 becomes HIGH which is supplied to pin 10 of flat cable JD so that Q007 on the process board is ON for stopping on the process board.

Vcc of IC011 Serial data signal for standby code signal from D07 (pin 35) of IC002 is supplied to VCR for setting the VCR at standby mode.

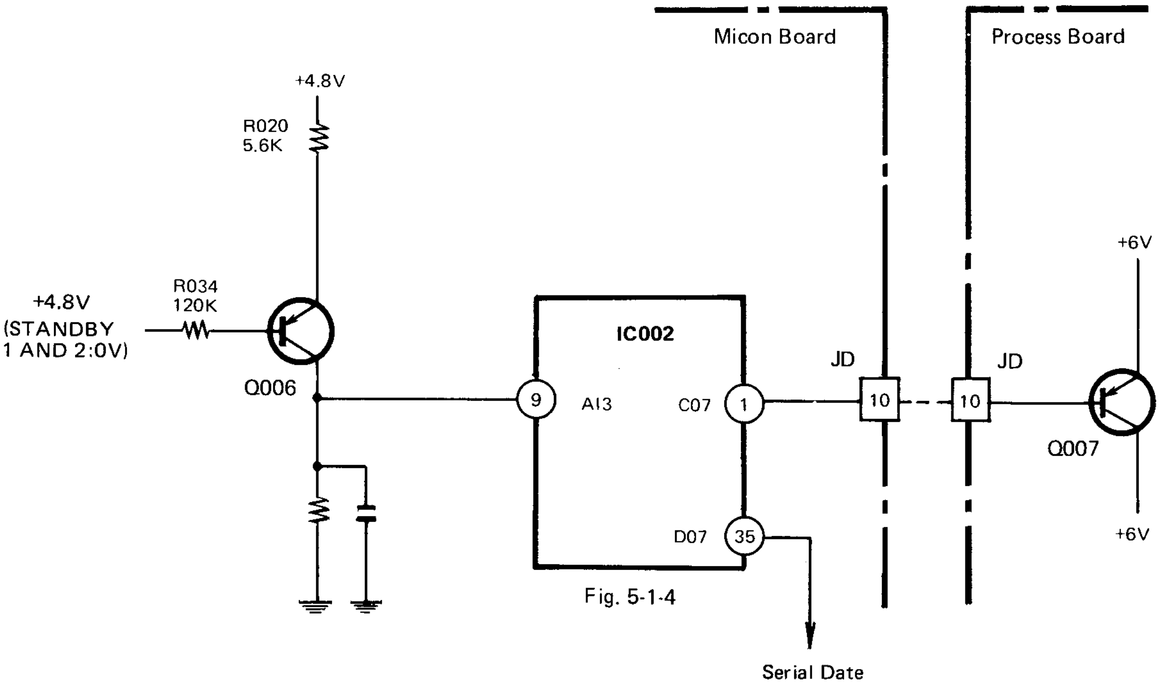

Micon Board
Process Board
+4.8V
R020
5.6K
+4.8V
(STANDBY
1 AND 2:0V)
R034
120K
Q006
IC002
9
AI3
C07
1
D07
35
JD
10
JD
10
+6V
Q007
+6V
Fig. 5-1-4
Serial Date

Fig. 5-1-3 Standby Detector

The REC RESET and White Balance RESET are shown in the Fig. 5-1-4.

The output port CO6 supplies the REC RESET signal to pin 9 of flat cable JD so that VCR start/stop switch becomes stop mode when the camera is in standby mode.

The output port CO02 of IC004 supplies the W/B (white balance) RESET signal to pin 16 of flat cable JD so that the automatic white balance setting circuit on the process board is reset whenever the indoor/outdoor switch is changed.

5-2 Input Interface

The input interface circuits consist of the three blocks as;

. EVF Display Board Circuit
. VCR Remote Control Board Circuit
. Camera Conditions Selection Circuit

and these are constructed in the matrix circuit.

The output ports and input ports of the micro processor is incorporated with the matrix circuit as shown in the Fig. 5-2-1.

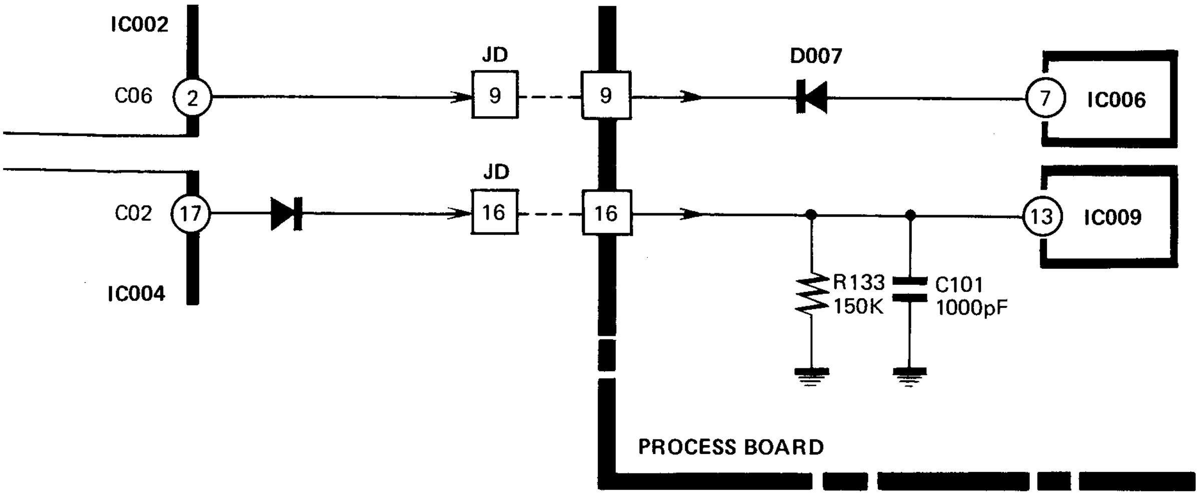

IC002
C06
2
JD
9
9
D007
7
IC006
C02
17
JD
16
16
13
IC009
IC004
R133
150K
C101
1000pF
PROCESS BOARD

Fig. 5-1-4 RESET Circuit

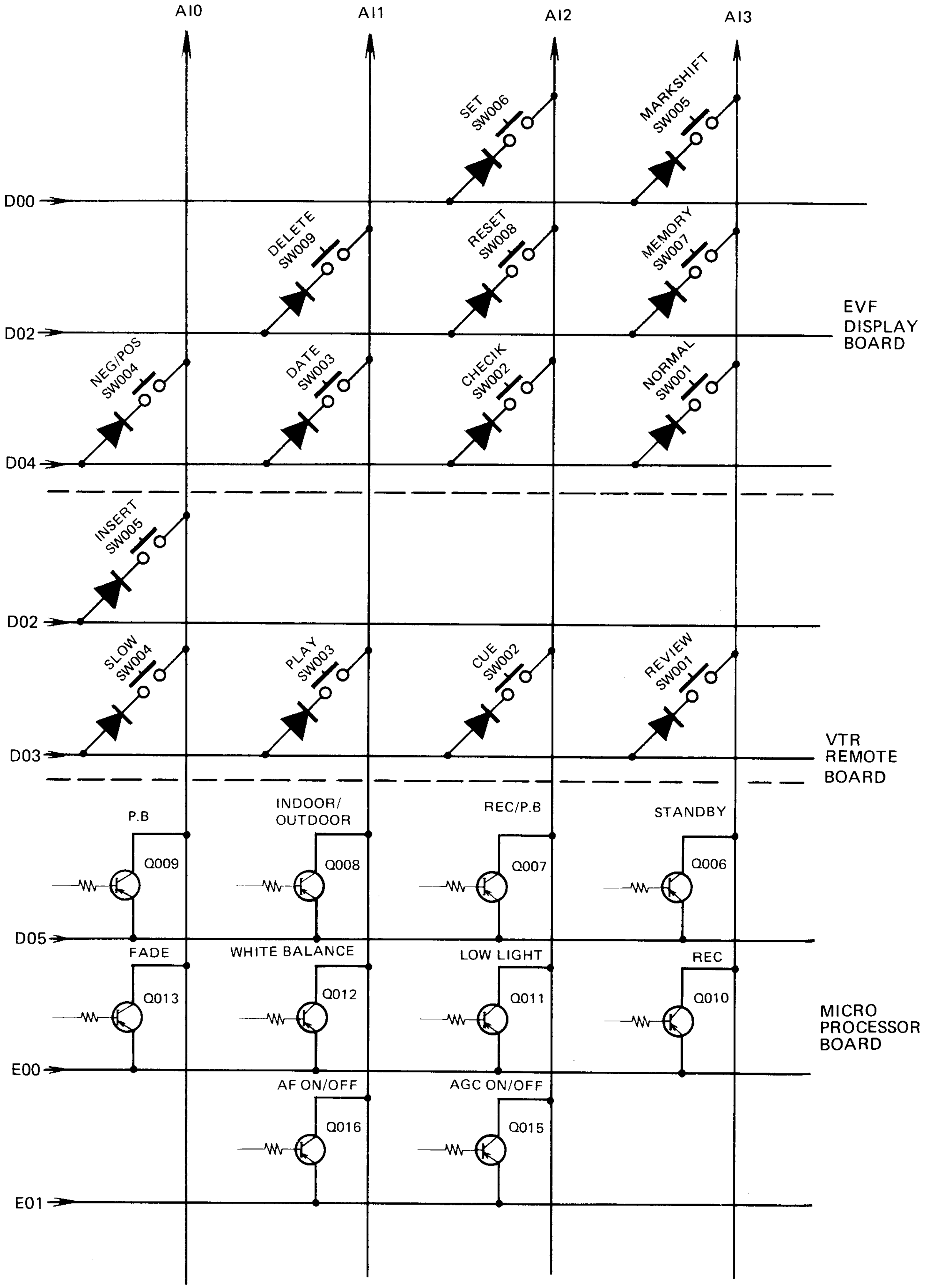

AI0
AI1
AI2
AI3
SET
SW006
MARKSHIFT
SW005
D00
DELETE
SW009
RESET
SW008
MEMORY
SW007
D02
EVF
DISPLAY
BOARD
NEG/POS
SW004
DATE
SW003
CHECIK
SW002
NORMAL
SW001
D04
INSERT
SW005
D02
SLOW
SW004
PLAY
SW003
CUE
SW002
REVIEW
SW001
D03
VTR
REMOTE
BOARD
P.B
INDOOR/
OUTDOOR
REC/P.B
STANDBY
Q009
Q008
Q007
Q006
D05
FADE
WHITE BALANCE
LOW LIGHT
REC
Q013
Q012
Q011
Q010
MICRO
PROCESSOR
BOARD
E00
AF ON/OFF
AGC ON/OFF
Q016
Q015
E01

Fig. 5-2-1 Input Interface Circuit

The programmed signals (key scan pulses) are supplied from the output ports DO0 - DO5 and EO0 - EO1 to the matrix circuit so that the programmed signals are returned to the input ports AI0 - AI3 through diodes/switches, diodes and transistors in the matrix circuit. The micro processor, IC002 will know the function of the camera by detecting the returned programmed signal at the input ports AI0 - AI3.

The signals through diodes/switches are selected by operator's action as follows;

FROM	SW	TO	Camera's Function
DO0	SW006	AI2	SET
DO0	SW005	AI3	MARKSHIFT
DO2	SW009	AI1	DELETE
DO2	SW008	AI2	RESET
DO2	SW007	AI3	MEMORY
DO2	SW005	AI0	INSERT
DO3	SW004	AI0	SLOW
DO3	SW003	AI1	PLAY
DO3	SW002	AI2	CUE
DO3	SW001	AI3	REVIEW
D04	SW004	AI0	NEG/POS
D04	SW003	AI1	DATE
D04	SW002	AI2	CHECK
D04	SW001	AI3	NORMAL

The signals through transistors are selected by the electronic signals at the bases of transistors as follows;

FROM	TR	BASE OF TR	TO	Camera's Function
DO5	Q009	HIGH	AI0	NORMAL
DO5	Q009	LOW	AI0	PLAYBACK
DO5	Q008	HIGH	AI1	OUTDOOR
DO5	Q008	LOW	AI1	INDOOR
DO5	Q007	HIGH	AI2	REC
DO5	Q007	LOW	AI2	PLAY
DO5	Q006	LOW	AI3	STANDBY 1 and 2
EO0	Q013	LOW	AI0	FADE IN/OUT
EO0	Q012	LOW	AI1	WHITE OK
EO0	Q012	HIGH	AI1	WHITE (Flashing)
EO0	Q011	LOW	AI2	LIGHT OK
EO0	Q011	HIGH	AI2	LIGHT (Flashing)
EO0	Q010	LOW	AI3	REC
EO1	Q016	LOW	AI1	AF ON
EO1	Q016	HIGH	AI1	AF OFF
EO1	Q015	LOW	AI2	AGC ON
EO1	Q015	HIGH	AI2	AGC OFF

According to the signals at the input ports of the micro processor, IC002, the micro processor supplies the graphics instructions to the character generator, IC003 and serial data for VCR.

The inhibit circuit is shown in Fig. 5-2-2.
The inhibit signal (HIGH) data of serial clock is supplied to base of Q003 through pin 18 of flat cable JD so that Q003 is ON and the collector of Q003 becomes LOW for resetting VTR start/stop switch circuit inside of IC006 on the process board.

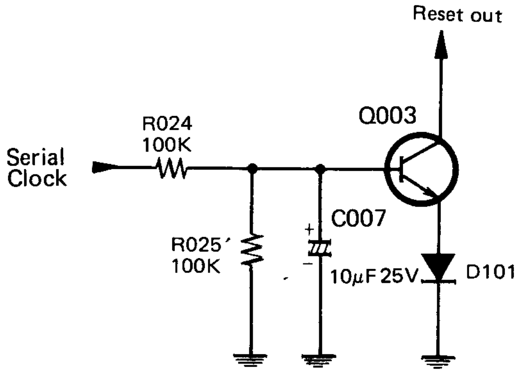


Fig. 5-2-2 Inhibit Circuit

5-3 Character Generator

The display characters are separated into the two categories as;

(1) A : Cannot be recorded and only display on the EVF.

(2) B : Can be recorded and supplied to VCR recorder.

The pin identifications and functions of IC003 is described in Table 5-2.

The clock pulse frequency of IC003 is adjusted by VR001 (CHARACTER SIZE).

The process for the display characters is shown in Fig. 5-3-1.

The character output (A + B) at pin 13, VOW of IC003 is supplied to pin 6 of flat cable JC so that the character output is supplied to pin 16 of IC005 on the deflection board through flat cable JC.

The character output (A + B) is separated into the graphics (A) and graphics (B) inside IC005 on the deflection board.

The graphics (A) is mixed with the (EVF video + B) so that the signal (A + B + EVF video) is supplied from pin 24 of IC005 and supplied to pin 2 of CN005 for EVF on the deflection board.

The graphics (B) is mixed with the video signal inside IC002 on the process board and the NTSC signal (video + B) is supplied from pin 13 of IC002 to pin 5 of CN006 on the process board and the signal (EVF video + B) is also supplied from pin 13 of IC002 through the trap, CF004 to pin 8 of flat cable JC which is supplied to pin 18 of IC005 on the deflection board through flat cable JC.

The signal (EVF video + B) is mixed with the graphics (A) inside IC005 on the deflection board so that the signal (EVF video + B + A) is supplied from pin 24 of IC005.

The signal (EVF video + A + B) is supplied to pin 7 of CN005 on the deflection board.

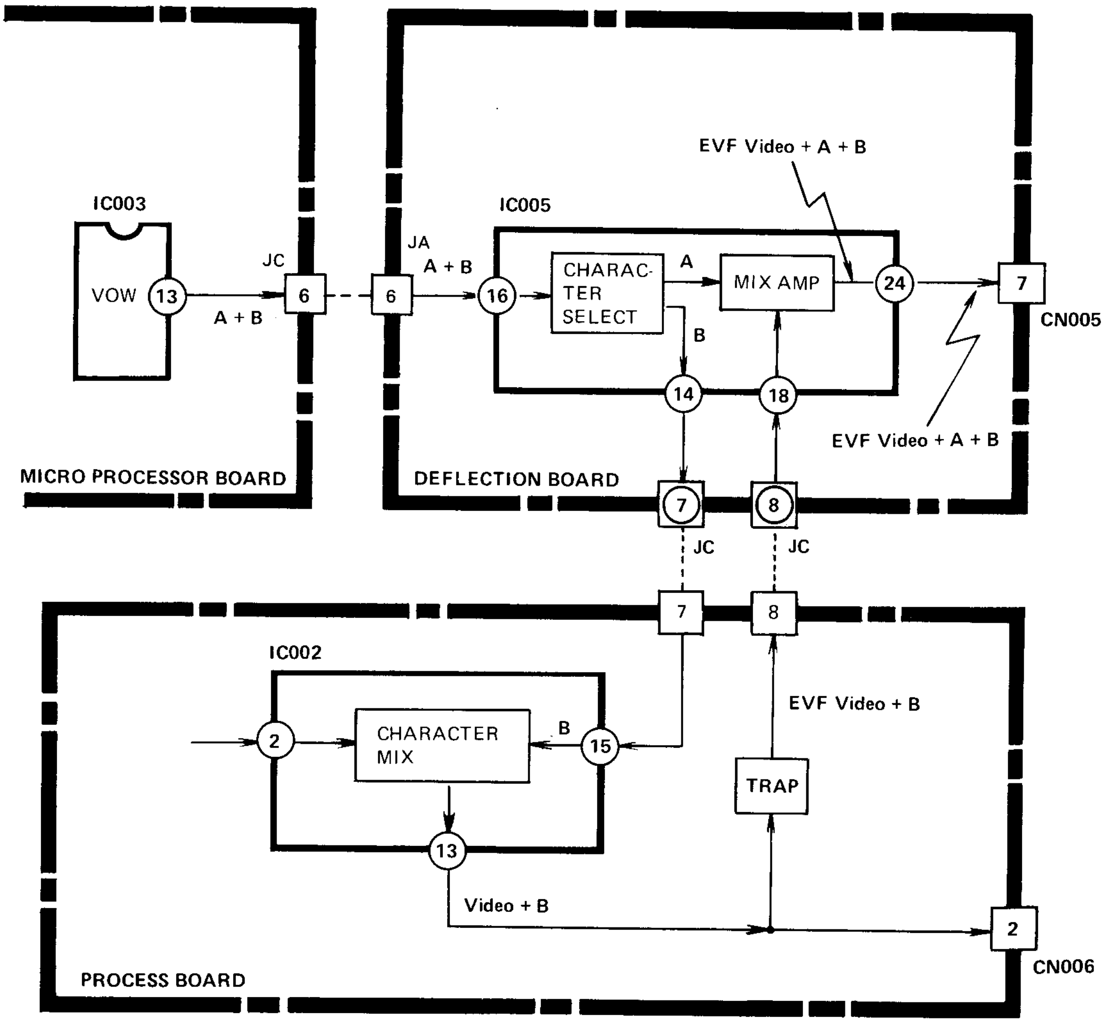

IC003
VOW
13
JC
A + B
6
MICRO PROCESSOR BOARD
JA
A + B
6
16
IC005
CHARACTER SELECT
A
B
MIX AMP
EVF Video + A + B
24
7
CN005
14
18
EVF Video + A + B
DEFLECTION BOARD
7
8
JC
JC
7
8
IC002
2
CHARACTER MIX
B
15
EVF Video + B
TRAP
13
Video + B
2
CN006
PROCESS BOARD

Fig. 5-3-1 Process of Display characters

Table 5-2 : Pin Identifications and Function of Character Generator IC003

Pin No.	Name	Description
1	Vss	Connect to Ground
2	DA0	Data input bus
3	DA1	Data input bus
4	DA2	Data input bus
5	DA3	Data input bus
6	DA4	Data input bus
7	DA5	Data input bus
8	DA6	Data input bus
9	LDI	Strobe pulse input
10	ADM	Address Mode Select pulse input
11	TST	Test input. Normally connect to Ground.
12	VDD	+4.8V input
13	VOW	Character output (positive polarity)
14	VOB	Not used
15	DO0	Not used
16	DO1	Not used
17	DO2	Not used
18	DO3	Not used
19	H.SYNC	H.SYNC input
20	V.SYNC	V.SYNC input
21	OSC 1	Clock pulse generator input
22	OSC 2	Clock pulse generator input

6 Auto Focus Board (YFES950-24A), (YFES-950-24B), (YFES950-24C), (YFES950-24D)

The Auto Focus Board contains following circuits.

page
6-1 General 57
6-2 Ultrasonic Transmission Circuit 58
6-3 Ultrasonic Echo-Reception Circuit 59
  6-3-1 Echo-Reception Circuit 59
  6-3-2 Variable Reference Voltage Circuit 60
6-4 Motor Driving Circuit 61
  6-4-1 Data Process in IC001 for Motor Driving Circuit 61
  6-4-2 Lens Position Sensor 61
  6-4-3 Motor Driving Circuit 62
6-5 Supporting Circuit 63
  6-5-1 Regulators/Power Supply 63
  6-5-2 Thermal Correction Circuit 63
  6-5-3 Interface Circuit 63

6-1 General

This auto focus system is utilizing the ultrasonic to measure the time between the ultrasonic transmission and echo-reception at the transducer and controls the lens focus automatically.

The time represents the distance between the camera-/lens and object.

The all functions of this auto focus system are controlled by the MPU (Micro Process Unit).

The system primary consists of the four circuit blocks as;

(1) Ultrasonic Transmission Circuit
(2) Ultrasonic Echo-Reception Circuit
(3) Lens Motor Driving Circuit
(4) Supporting Circuits

The functional block diagram of the auto focus system is shown in Fig. 6-1-1.

The transmission circuit transmits the 70KHz pulsed ultrasonic from the PCM (Piezo Ceramic Material) transducer when the timing pulse is provided from Micro process unit IC001.

The ultrasonic echo-reception circuit receives the echo at the transducer and amplifies the echo signal for the comparison with the variable reference voltage which varies to lower when the echo-reception time is longer. The ultrasonic echo level at the transducer is almost in inverse proportion to the distance/time so that the echo level from the near object is stronger and the echo level from the far object is weaker if the ultrasonic echo level is compared with the specified reference voltage.

This means that the sensitivity for the near object is overleveled and the sensitivity for the far object is not enough for the echo-reception circuit.

This auto focus system is primary designed to response the human being so that the echo level from the human being is varied according to the position and is set to be higher than the reference voltage which is varied per echo distance/time to the object as shown in Fig. 6-1-2.

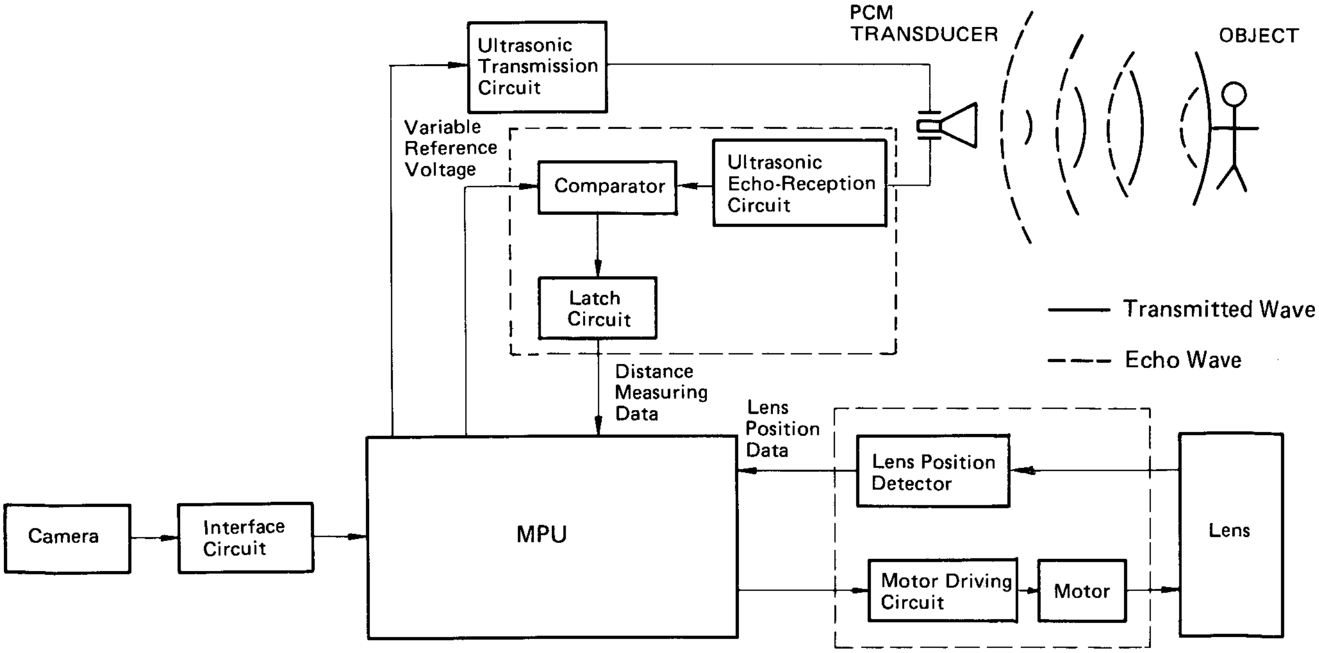

Ultrasonic Transmission Circuit
PCM TRANSDUCER
OBJECT
Variable Reference Voltage
Comparator
Ultrasonic Echo-Reception Circuit
Latch Circuit
Distance Measuring Data
Lens Position Data
Transmitted Wave
Echo Wave
Lens Position Detector
Camera
Interface Circuit
MPU
Lens
Motor Driving Circuit
Motor

Fig. 6-1-1 Functional Block Diagram of Auto Focus System

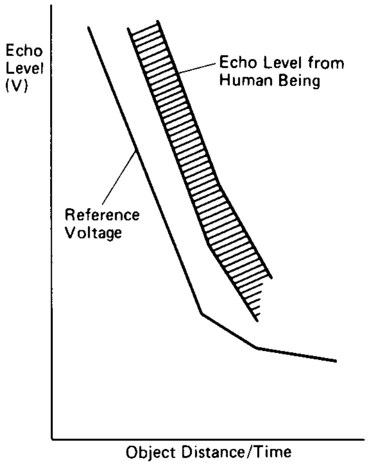


Fig. 6-1-2 Echo Level and Reference Voltage

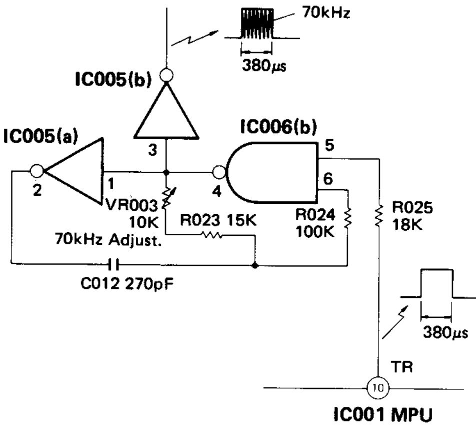


Fig. 6-2-1 Ultrasonic Generator

The echo level and the variable reference voltage is compared by the comparator which output is fed to the latch circuit when the echo level becomes higher than the variable reference.

The output of the comparator is supplied to IC001 after the output is holding by the latch circuit.

IC001 measures the time which the ultrasonic is transmitted and received from/on the transducer, and calculates the distance between the camera and the object based on the wave speed of the ultrasonic.

IC001 detects the lens focus position and instructs the motor driving circuit to activate the motor for turning focus ring to the desired position.

The effective focus rotational range is divided by 64 positions.

6-2 Ultrasonic Transmission Circuit

Outline

This circuit generates the ultrasonic and transmits the ultrasonic from the transducer.

Details

The clock pulse for IC001 is generated by 400KHz ceramic oscillator circuit consisting of X001, R034, C019 and C020.

The 380 us timing pulse is generated at pin 10 of IC001 in the vertical blanking period.

The 3 ms pulse at pin 11 of IC001 is supplied to pin 5 of IC006 and the ultrasonic is generated during the 3 ms pulse period by the 70KHz OSCILLATOR circuit consisting of IC006(b), IC005(a) and IC005(b) as shown in Fig. 6-2-1.

The frequency of generated ultrasonic is adjusted by VR003 (70KHz ADJ) to 70KHz.

The ultrasonic Transmission circuit is shown in Fig. 6-2-2.

To reduce the pulsed audio for generating the ultrasonic, the trapezoid pulsed ultrasonic is transmitted.

The 380 μs timing pulse at pin 10 of IC001 is supplied to the base of Q017.

The pulse at the collector of Q017 is integrated by R070 and C039 to be trapezoid at the collector of Q018. The trapezoid pulse is rounded its corner by R073 and C031 and amplified by Q019 and Q020.

The pulsed ultrasonic at pin 4 of IC005 is provided to the base of buffer Q004. Q005 is switching by the pulsed ultrasonic at the base of Q005 and the pulsed ultrasonic is transferred and built up during trapezoid period at the primary of T001.

The amplitude of the trapezoid pulsed ultrasonic at the secondary of T001 is approx. 160 - 180Vp-p which is transmitted from the PCM transducer after passing through D004 and D005.

D004 and D005 diodes cut the level less than ± 0.7V so that the induced noise of T001 is cut for improving the echo reception at no transmission from the transducer. When the trapezoid pulsed ultrasonic is transmitted, the current approx. 1 - 2 amperes is passed through T001 and creates the noises which are not observed, because the trapezoid pulsed ultrasonic is transmitted during the vertical blanking period.

To prevent the effects on the other circuits, the separate regulated power supplies are used.

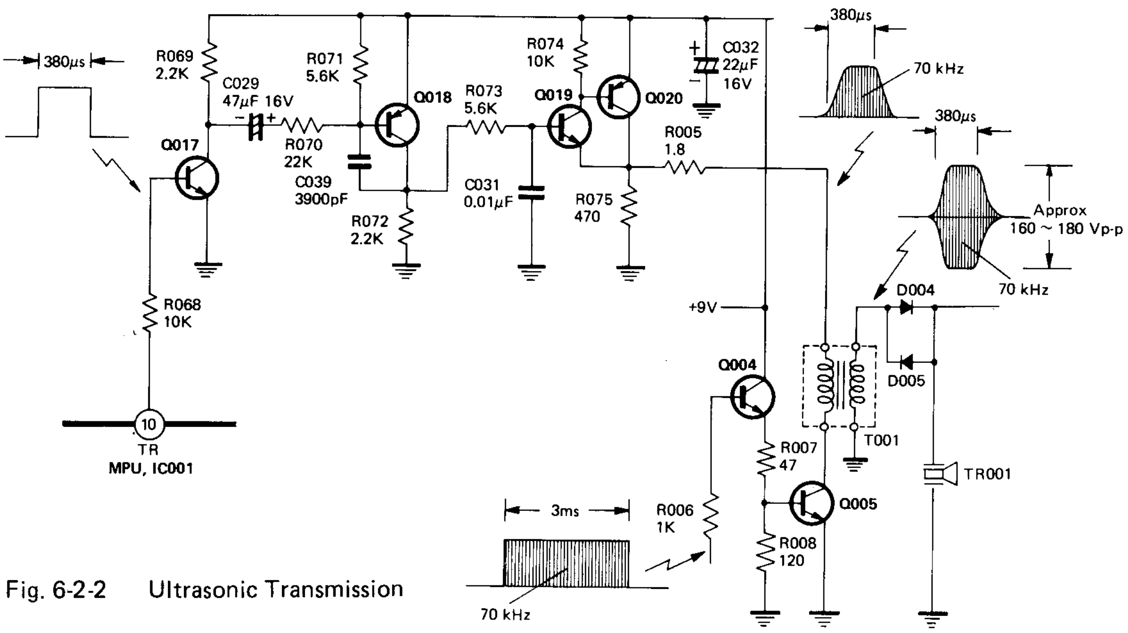

380μs
R069
2.2K
C029
47μF 16V
R071
5.6K
R070
22K
C039
3900pF
R072
2.2K
Q017
Q018
R073
5.6K
R074
10K
Q019
Q020
C031
0.01μF
R075
470
C032
22μF
16V
R005
1.8
380μs
70 kHz
380μs
Approx
160 ~ 180 Vp-p
70 kHz
D004
D005
+9V
Q004
T001
R007
47
Q005
R008
120
R006
1K
TR001
3ms
70 kHz
R068
10K
10
TR
MPU, IC001

Fig. 6-2-2 Ultrasonic Transmission

6-3 Ultrasonic Echo-Reception Circuit

Outline

This circuit receives the echo at transducer and the echo is sent to IC001 after comparing with the reference voltage and IC001 calculates the time/distance between the lens/camera and the object.

Details

6-3-1 Echo-Reception Circuit

The echo is received at transducer after several msec from the transmission and the echo level is in inverse proportion to the distance from the lens/camera and the object.

Due to the very low echo level at the transducer, the gain of the echo-reception circuit is approx. 100dB and the echo-reception circuit is shown in Fig. 6-3-1.

R009 and C003 are for matching impedance with T001. D006 and D007 cut off the level more than ± 0.7V for preventing excessive input at the pin 2 of operational amplifier IC002.

The echo at the transducer is supplied to pin 2 of IC002 and is amplified by IC002 and Q006. The amplifier gain of the echo-reception circuit is adjusted by VR001 (GAIN).

L001 is the resonance 70KHz band pass filter for improving the signal to noise ratios at 70KHz.

This auto focus system is primarily designed to focus on the human being object and is not responsed to the object which echo-ratio is less than that of human being. The echo level from the human being is getting less as the human being is getting away from the camera.

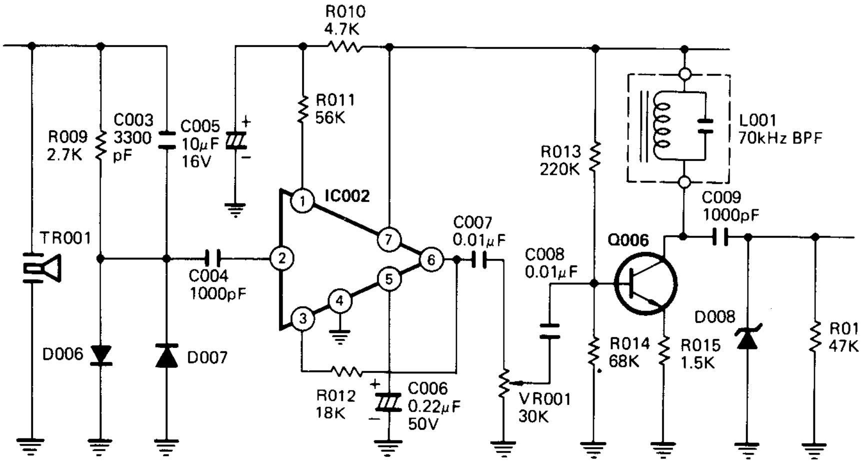

R010
4.7K
R011
56K
R009
2.7K
C003
3300
pF
C005
10μF
16V
IC002
1
2
3
4
5
6
7
TR001
C004
1000pF
D006
D007
R012
18K
C006
0.22μF
50V
C007
0.01μF
C008
0.01μF
VR001
30K
R013
220K
L001
70kHz BPF
C009
1000pF
Q006
R014
68K
R015
1.5K
D008
R016
47K

Fig. 6-3-1 Ultrasonic Echo Reception Circuit

The comparator, the reference voltage and the latch circuit are shown in Fig. 6-3-2.

D008, 5V zener prevents the excessive input to be supplied to comparator IC003.

The output is provided at pin 7 of IC003 when the echo level at pin 5 of IC003 becomes higher than the variable reference voltage at pin 6.

To hold the output at pin 7 of IC003, the flip-flop latch circuit, IC006(c) and IC006(d) is functioned after reset pulse is provided at pin 8 of IC006(c) from pin 20 of IC001.

The hold level of the F.F. latch is supplied to pin 21 of IC001. The reset pulse is provided after approx. 4ms from the starting time of the ultrasonic transmission so that the latch circuit is not functioned during transmitting period.

IC001 calculates the time period/distance between the starting time of 380 μs transmitting timing pulse and the starting time of the holding echo at the pin 10 of IC006. This time period represents the distance of the object from the lens/camera.

6-3-2 Variable Reference Voltage Circuit

C010 is charged by Q007 which is functioned during the 3ms pulse width at the base of Q007.

The voltage at C010 represents the variable reference voltage at pin 6 of IC003 and is reduced after the 3ms pulse at the base of Q007 according to the slant line which is determined by the time constant consisting of C010, R021, VR002 and TH002 and is adjusted by VR002. (REF. V. SET)

The variable reference voltage is designed to set the approx. 10dB lower than the human being echo signal for the optimum emission angle and effective distance (see Fig. 6-1-2 in page 58).

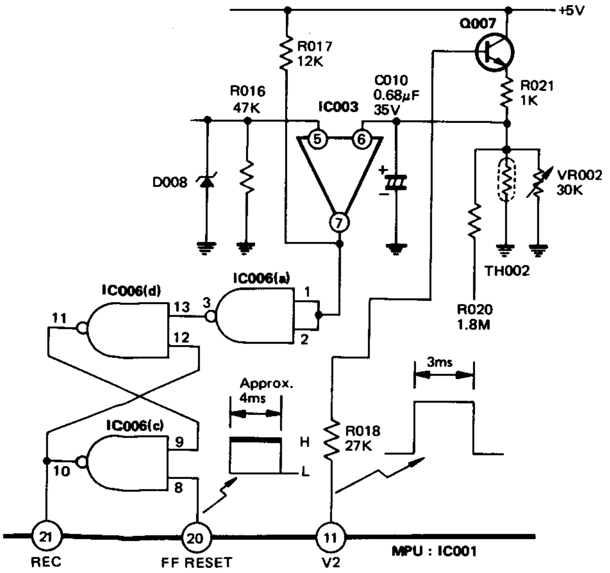


Fig. 6-3-2 Comparator Reference Voltage and Latch Circuits

The timing chart for the transmission and the echo-reception is shown in Fig. 6-3-3.

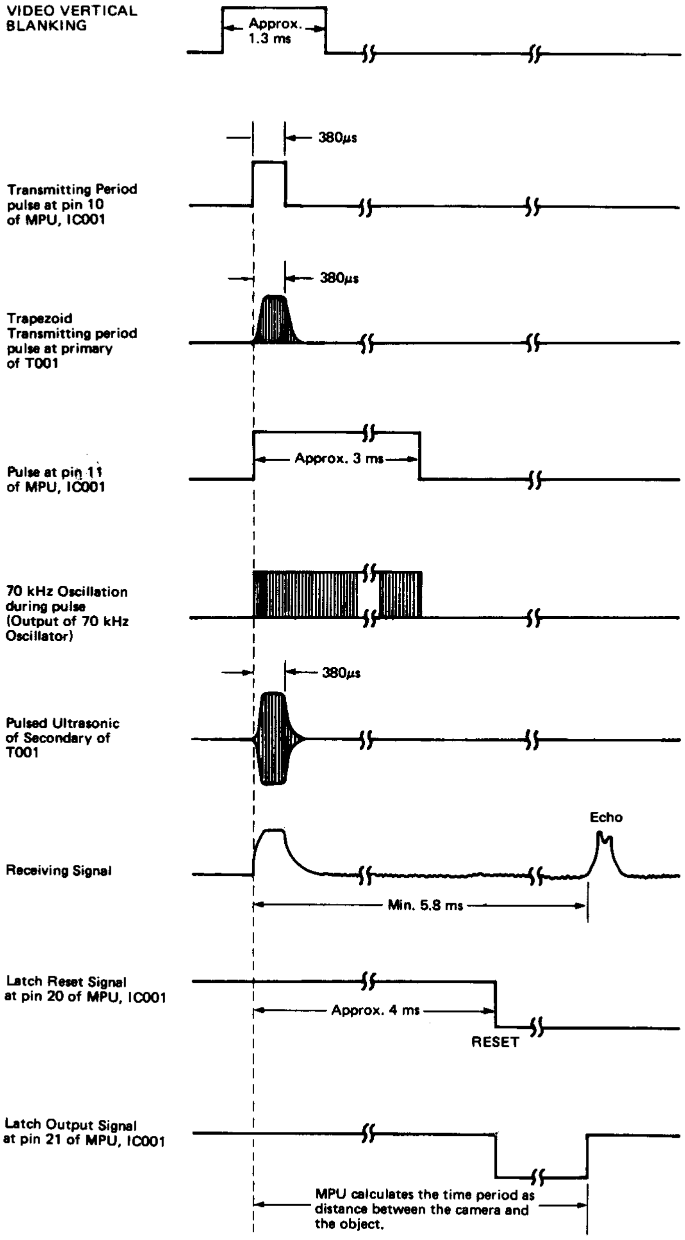


Fig. 6-3-3 Timing Chart for Measuring Time/Distance

6-4 Motor Driving Circuit

Outline

This circuit detects the position of the lens motor/current lens position of the focus ring and provides the informations to IC001.
IC001 processes the informations of the echo signals and the lens positions, and activates the lens motor driving circuit to rotate the focus ring for the desired position.

Details

6-4-1 Data Process in IC001 for Motor Driving Circuit

Considering the external disturbances such as a metallic noise, telephone bell and clock bell etc, or the camera operations under bad conditions, the auto focus might be misoperationed whenever the auto focus is responded for each echo signal.
To avoid the misoperation, IC001 has the 6 registers for storing 6 distance-data.
When the 7th data is input into IC001, the 1st stored register data is shifted off.
IC001 always stores 6 data in the 6 registers as shown in Fig. 6-4-1.
IC001 checks the 6 data and neglects the data which is excessively different from other levels.
The similar data is shown with the asterisk mark in Fig. 6-4-1, for example.
IC001 makes the average of four data, 15, 14, 15 and 16 in the 1st status as 15 and activates the focus motor to be 15 lens point.
When the new echo/data is input as 12 lens point, IC001 makes the average of four data, 12, 15, 14 and 15 in the 2nd status as 14 lens point and activates the focus motor to be 14 lens point.
In this way, the misoperation is avoided and the auto focusing is not responded when the external disturbances occur or something is rapidly crossed in front of the camera/lens.
When the camera is aimed at the fixed object, the 6 distance data may be same. When more than 3 data of 6 are the same, the transmission interval becomes 0.3 sec by force to save the power consumptions.

6-4-2 Lens Position Sensor

This sensor detects the current position of the lens focus ring which has the gray codes pattern with 7 brush contacts around the focus ring.
The part of the gray codes pattern is shown in Fig. 6-4-2.

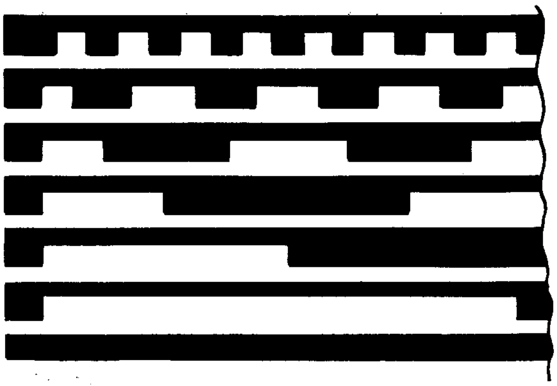


Fig. 6-4-2 Gray Codes Pattern for Lens Position Detector

The effective focus range is divided into 64 lens points and the gray codes for this 64 lens points are shown in Fig. 6-4-3.
The numbers 1-6 of the first column in Fig. 6-4-3 is corresponded with the numbers of the connector for the focus ring position sensor in the schematic diagram.

In order to eliminate the ambiguity of the number, the gray codes change only one bit when the number moves one to the next.
When the brush contact is open, the level of the contact position is HIGH (+5V) and the bit is "1".

When the brush contact is close, the level of the contact position is LOW (0V) and the bit is "0".
C013 is used for noise protection.
The binary codes for focus ring position/lens position is provided at pin 2 - 7 of IC001 from focus ring position sensor, then IC001 has the information of the focus ring position, so that IC001 detects the lens focus position.

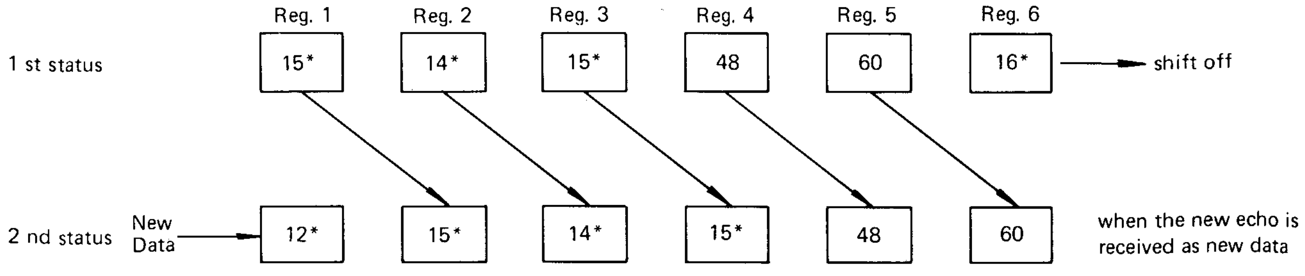


Fig. 6-4-1 6 Register/Data in MPU

	1 m												1.2 m										1.5 m									
	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32
1	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0
2	0	0	1	1	1	1	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1	0	0
3	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0
4	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

	2.0 m										3.0 m										5.0 m						9.7 m						∞
	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
1	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0
2	0	0	1	1	1	1	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1	0	0
3	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0
4	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Fig. 6-4-3 Output Informations of Encoder for Position of Lens Focus Ring
(Gray Codes) : 1 : High (Open Contact)
0 : Low (Close Contact)

6-4-3 Motor Driving Circuit

Auto Focus Mode

- For clockwise rotation (FAR) :

The +5V DC is supplied from pin 16 of IC001 to the base of Q013 so that Q013 and Q015 are ON for rotating focus motor, until the focus ring becomes desired position.

- For counterclockwise rotation (NEAR) :

The +5V DC is supplied from pin 17 of IC001 to the base of Q016 so that Q016 and Q012 are ON for rotating focus motor, until the focus ring becomes desired position.

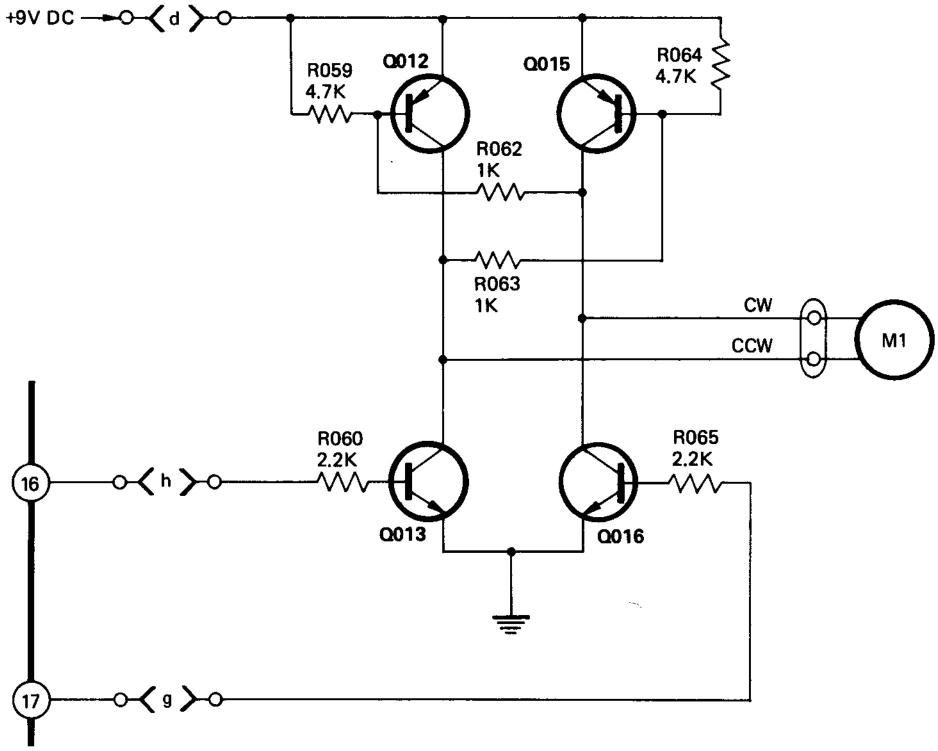


Fig. 6-4-4 Motor Driving Circuit

6-5 Supporting Circuit

Outline

This circuit consists of the three regulators for the power supply, thermal correction, interface and reset at the power on and supports the stable operation of the system.

Details

6-5-1 Regulators/Power Supply

There are three regulators for the power supply as;

(1) +9V DC Regulator

The +9V DC regulator consists of Q001, Q002, Q003, D002 and D003, and regulates +9V for the ultrasonic transmission circuit.

During the ultrasonic transmission, the large current, approx. 1 - 2 amperes is flowed into the primary of T001 so that the separate and stable power supply is needed for the transmission.

The +12V DC input is supplied from pin 1 of CN103 to this +9V DC regulator through D001.

The +9V DC regulator also supplies the power to the echo-reception circuit and thermal correction circuit through the +5V DC regulator, IC004, and the motor driving circuit.

When the camera is in the standby mode, the +5V DC is supplied to the base of Q001 from pin 19 of IC001. Then, +9V DC regulator becomes off so that the transmission, echo-reception, thermal correction and motor driving circuits are off.

(2) +5V DC Regulators

There are two +5V DC regulators, IC004 and IC007. The IC004 is the power supply for the echo-reception and thermal correction circuits, and is shut off when the camera is in the standby mode. The +9V DC input is supplied from the +9V DC regulator.

IC007 is the power supply for IC001, interface and the IC001 reset circuits, and is always in operational state even in the camera's standby mode.

6-5-2 Thermal Correction Circuit

The speed of the ultrasonic wave in the air is effected by the temperature.

When the temperature is changed from 0°C (32°F) to 40°C (104°F), the speed of the ultrasonic wave in the air is varied approx. 7% so that the correction circuit is needed for the accurate measurements of the time/distance.

The thermal correction circuit consist of IC008, thermister TH001, corrects the reference of time/distance detection.

The correction signal is provided at pin 23 and 24 of IC001.

6-5-3 Interface Circuit

This circuit is interfaced for the informations between the camera and IC001.

At first, reset circuit resets IC001 at the power on with the IC005(c), IC005(d) and IC005(e).

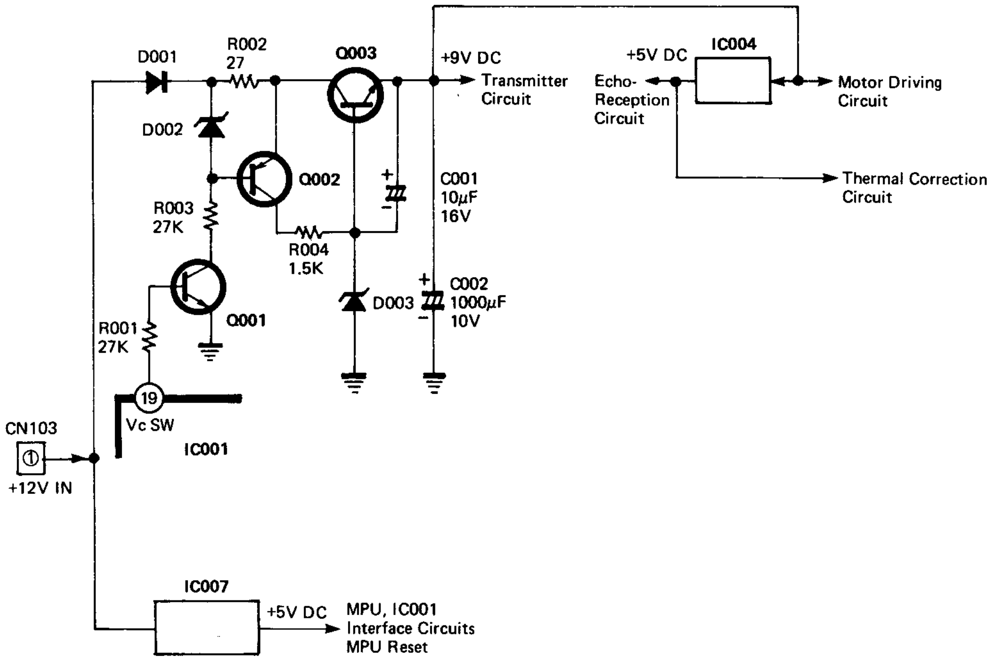

D001
R002
27
Q003
+9V DC
Transmitter Circuit
+5V DC
IC004
Echo-Reception Circuit
Motor Driving Circuit
D002
Q002
C001
10μF
16V
Thermal Correction Circuit
R003
27K
R004
1.5K
C002
1000μF
10V
D003
R001
27K
Q001
19
Vc SW
IC001
CN103
①
+12V IN
IC007
+5V DC
MPU, IC001
Interface Circuits
MPU Reset

Fig. 6-5-1 Regulators/Power Supply

The informations at 5 pins connector of AF connector CN102 are as;

(a) Pin 1

+12V DC

(b) Pin 2

The positive polarity Vs at pin 2 of CN103 is supplied to the base of Q011 through C025 so that the Q011 is ON for detecting Vs pulse at pin 25 of IC001. Pin 13 of IC001 supplies HIGH signal to the base of Q010 through R046 for effecting the switches, SW001 and SW002. Q009 is not functioned for only Vs.

When the switch SW001 (AUTO FOCUS ON/OFF) is open, the auto focus mode is OFF position and Q010 is ON by applying the HIGH at the base of Q010 so that the level at pin 22 of IC001 becomes LOW for the manual focusing.

When SW001 is close, the auto focus mode is ON position and the base of Q010 becomes LOW and Q010 is OFF so that the level at pin 22 of IC001 becomes HIGH for the auto focusing. When SW001 is open and the SW002 (AUTO/MAN) is kept pressing, the base of Q010 also becomes LOW so that the level at pin 22 of IC001 becomes HIGH for the auto focusing.

When the Vs is not supplied, IC001 detects that the camera is in the standby mode and supplies HIGH at pin 19 of IC001 to shut off the +9V DC regulator, transmission, echo-reception, thermal correction and motor driving circuit become OFF.

(c) Pin 3

The EVF display information is supplied from pin 18 of IC001 according to the input information at pin 22 of IC001 as;

. LOW at pin 18 of IC001 when : Auto Focus Mode
  pin 22 of IC001 is HIGH
. HIGH at pin 18 of IC001 when : Manual Focus Mode
  pin 22 of IC001 is LOW

(d) Pin 4

Not used.

7 Electronic Viewfinder Board (YFVPKA0803JA)

The electronic viewfinder (EVF) board contains following circuits.

page
7-1 Video Amplifier Circuit 64
7-2 Horizontal Deflection Circuit 65
7-3 High Voltage Circuit 65

7-1 Video Amplifier Circuit

Outline

This circuit amplifies the video signal supplied from the Deflection board and fed it to the cathode ray tube (CRT).

Details

The video signal mixed with level indicator signal and character signal from the Deflection board is supplied to amplifier Q002 through pin No. 6 of EVF connector CN101, terminal No. 8 of CN001 and VR002 (CONTRAST).

The amplified video signal at the collector of Q002 is then supplied to grid-1(G1) of the CRT through terminal No. 4 of BI001 and CRT socket CN003 together with DC voltage set by VR003 (BRIGHTNESS).

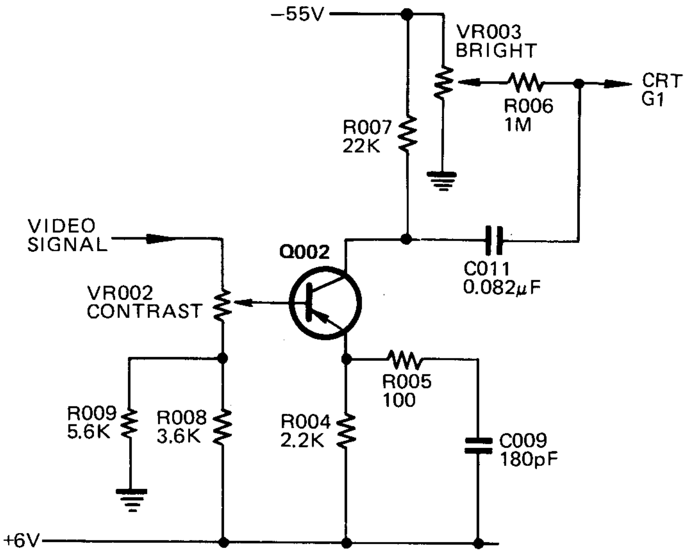


Fig. 7-1 Video Amplifier Circuit

7-2 Horizontal Deflection Circuit

Outline

This circuit generates the horizontal(H) deflection sawtooth current for H.scanning beam inside the cathode ray tube (CRT).

Details

The frequency controlled horizontal drive (H.D.) pulse from the Deflection board is supplied to the base of switching amplifier Q001 through pin No. 1 of EVF connector CN101 and terminal No. 5 of CN001.
The horizontal(H) deflection sawtooth current obtained at the collector of Q001 is supplied to the H.deflection coil through C002, L002, VL001 (H.SIZE) and terminal No. 4 of CN002.
The flyback pulse obtained at the collector of Q001 is also fed to the high voltage circuit.

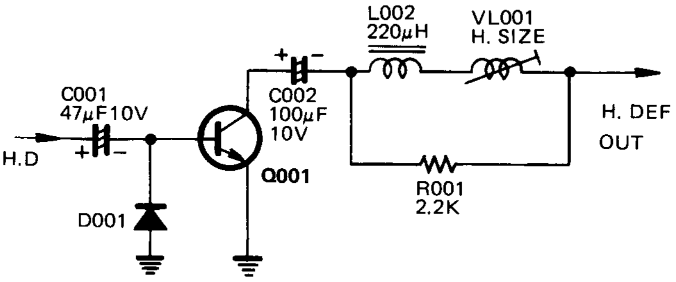

L002
220μH
VL001
H. SIZE
C001
47μF10V
H.D
C002
100μF
10V
Q001
D001
R001
2.2K
H. DEF
OUT

Fig. 7-2 H. Deflection Circuit

7-3 High Voltage Circuit

Outline

This circuit generates high voltages for cathode ray tube (CRT) electrodes.

Details

The flyback pulse generated in the horizontal(H) deflection circuit is supplied to primary winding of the flyback transformer (FBT) in high voltage pack T001 to step up the flyback pulse to necessary level. The boosted pulses obtained at the secondary winding of the transformer are rectified to generate high voltages.
+4.5KV obtained by rectifying the boosted pulse is supplied to the CRT anode.
+600V obtained by rectifying the boosted pulse with D003 and C005 is supplied to grid-3(G3) of the CRT through VR001 (FOCUS). The voltage of grid-2(G2) is derived by dividing +600V by VR001, R002 and R003.
The voltage of grid-1(G1) is derived by rectifying the negative pulse from the FBT by D002 and C008. Then the rectified -55V is supplied to G1 through VR003 (BRIGHTNESS) together with the video signal supplied from the video amplifier circuit.
The heater voltage for CRT is supplied +6V and +8.6V from the Deflection board through EVF connector CN101 and CN001.

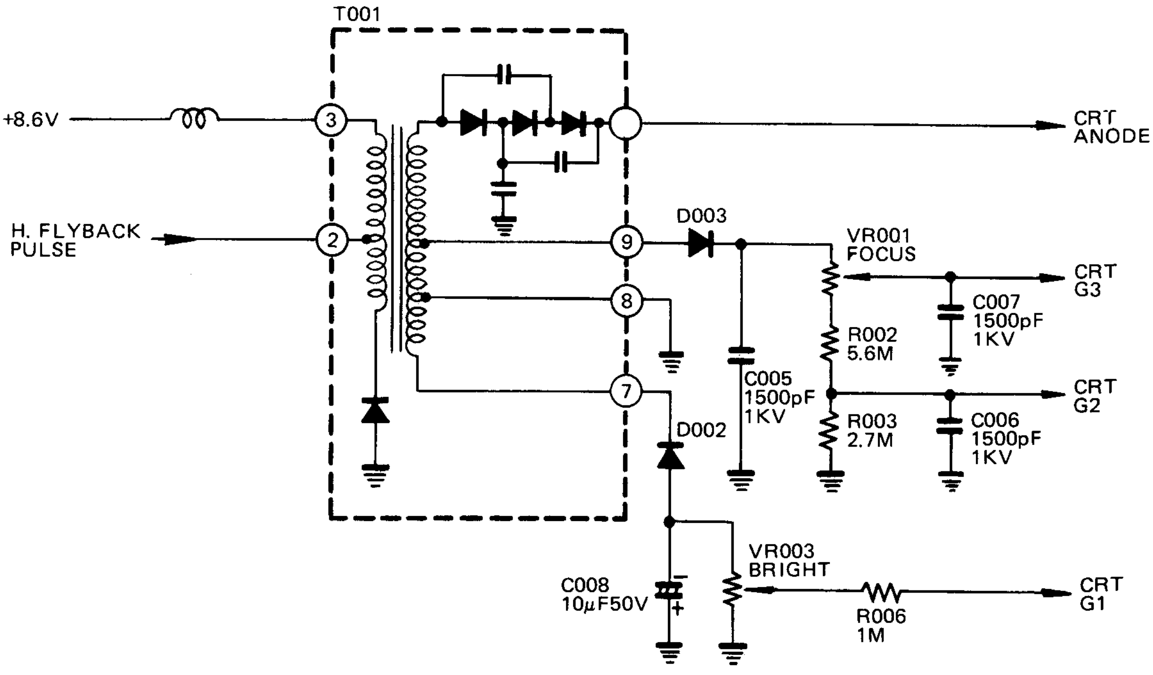

T001
+8.6V
H. FLYBACK
PULSE
3
2
9
8
7
CRT
ANODE
D003
VR001
FOCUS
CRT
G3
C007
1500pF
1KV
R002
5.6M
C005
1500pF
1KV
CRT
G2
R003
2.7M
C006
1500pF
1KV
D002
VR003
BRIGHT
C008
10μF50V
R006
1M
CRT
G1

Fig. 7-3 High Voltage Circuit

8. Shading Correction Board (YFVPKA0808JA)

The Shading Correction Board contains following circuits.

page

8-1 Vertical Sawtooth/Parabola Generator Circuit 66
8-2 Horizontal Sawtooth/Parabola Generator Circuit 66
8-3 Red Shading Correction Signal Generator Circuit 67
8-4 Blue Shading Correction Signal Generator Circuit 67
8-5 Dynamic Focus Correction Signal Generator Circuit 68
8-6 Bias Light Shading Correction Signal Generator Circuit 68

8-1 Vertical Sawtooth/Parabola Generator Circuit

Outline

This circuit generates the vertical sawtooth and parabola waveforms needed in the red and blue shading correction signal generator circuits, dynamic focus correction signal generator circuit and bias light shading correction signal generator circuit on the Process circuit board.

Details

The vertical scanning start pulse (Vs) from the Process circuit board enters the base of Q002 through terminal No. 1 of CN001.

The Vs pulse is then fed to a miller integrator consisting of R002, C001 and IC001 (a) and converted into a sawtooth.

The V.sawtooth signal at pin 1 of IC001 (a) is fed to the wiper arms of VR002 (V.SAWTOOTH) for the red shading correction, VR006 (V.SAWTOOTH) for the blue shading correction and VR010 (V.SAWTOOTH) for dynamic focus correction.

The V.sawtooth signal at pin 1 is also supplied to another miller integrator consisting of R003, C003 and IC001 (b) to convert it into a parabola signal.

The V. parabola signal obtained at pin IC001 (b) is fed to the wiper arms of VR001 (V.PARABOLA) for the red shading correction, VR005 (V.PARABOLA) for blue shading correction and VR009 (V.PARABOLA) for dynamic focus correction.

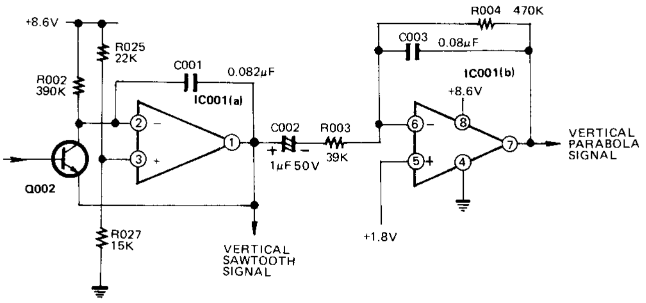


Fig. 8-1 Vertical Sawtooth/Parabola Generator Circuit

8-2 Horizontal Sawtooth/Parabola Generator Circuit

Outline

This circuit generates the horizontal sawtooth and parabola waveforms needed in the red and blue shading correction signal generator circuits dynamic focus correction signal generator circuit and bias light shading correction signal generator circuit on the Process circuit board.

Details

The horizontal scanning start pulse (Hs) from the Process circuit board enters the base of Q001 through terminal No. 2 of CN001.

The Hs pulse is then fed to a miller integrator consisting of R024, C005 and IC002 (a) and converted into a sawtooth signal.

The H.sawtooth signal at pin 1 of IC002 (a) is fed to the wiper arms of VR004 (H.SAWTOOTH) for the red shading correction, VR008 (H.SAWTOOTH) for the blue shading correction, VR012 (H.SAWTOOTH) for the dynamic focus correction and VR013 (H.SAWTOOTH) for the bias light shading correction.

The H.sawtooth signal at pin 1 is also supplied to another miller integrator consisting of R026, C007 and IC002 (b) to convert it into a parabola signal.

The H.parabola signal obtained at pin 7 of IC002 (b) is fed to wiper arms of VR003 (H.PARABOLA) for the red shading correction, VR007 (H.PARABOLA) for the blue shading correction, VR011 (H.PARABOLA) for the dynamic focus correction and VR014 (H.PARABOLA) for the bias light shading correction.

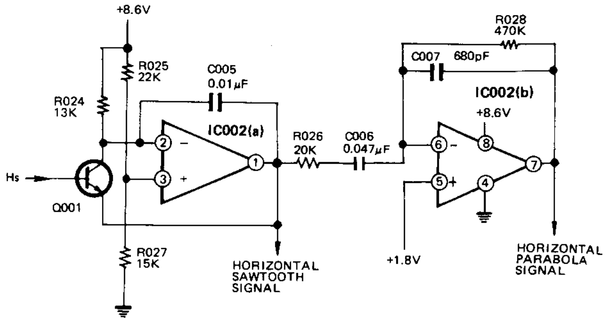


Fig. 8-2 Horizontal Sawtooth/Parabola Generator Circuit

8-3 Red Shading Correction Signal Generator Circuit

Outline

Refer the 4-13. Correction Signal Generator Circuit on page 42.

Details

The vertical sawtooth and parabola signals, and horizontal sawtooth and parabola signals which are generated by the vertical sawtooth/parabola generator circuit and horizontal sawtooth/parabola generator circuit are routed to the wiper arms of the red shading correction controls VR001 (V.PARABOLA), VR002 (V.SAWTOOTH), VR003 (H.PARABOLA) and VR004 (H.SAWTOOTH).

These signals are applied to both the inverted (pin 6) and non-inverted (pin 5) inputs of IC003 (b), where they are amplified.

The output of IC003 (b) at pin 7 produces a positive or negative red shading correction signal which depends on the position of these controls and it is fed to the correction signal generator circuit on the process board.

8-4 Blue Shading Correction Signal Generator Circuit

Outline

Refer the 4-13. Correction Signal Generator Circuit on page 43.

Details

The vertical sawtooth and parabola signals, and horizontal sawtooth and parabola signals which are generated by the vertical sawtooth/parabola generator circuit and horizontal sawtooth/parabola generator circuit are routed to the wiper arms of the blue shading correction controls VR005 (V.PARABOLA), VR006 (V.SAWTOOTH), VR007 (H.PARABOLA) and VR008 (H.SAWTOOTH).

These signals are supplied to both the inverted (pin 2) and non-inverted (pin 3) inputs of IC003 (a), where they are amplified.

The output of IC003 (a) at pin 1 produces a positive or negative blue shading correction signal which depends on the position of these controls and it is fed to the correction signal generator circuit on the process board.

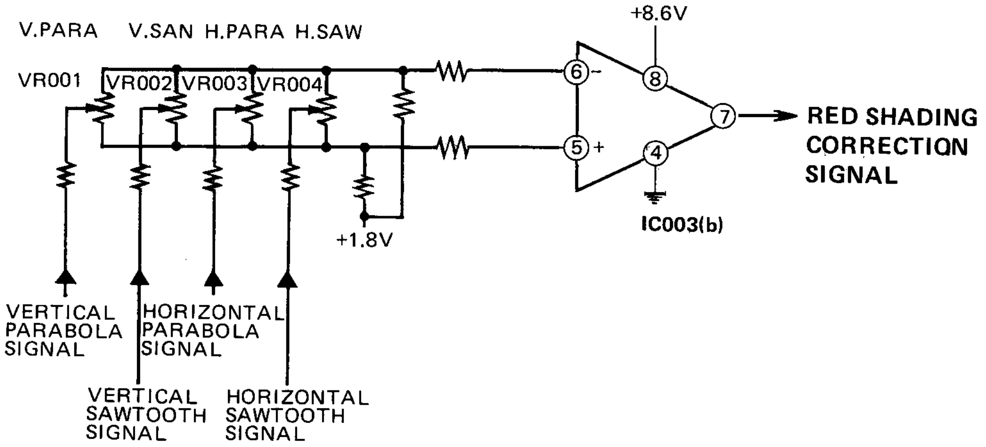

V.PARA
V.SAN
H.PARA
H.SAW
VR001
VR002
VR003
VR004
+8.6V
6
-
8
7
5
+
4
RED SHADING CORRECTION SIGNAL
IC003(b)
+1.8V
VERTICAL PARABOLA SIGNAL
HORIZONTAL PARABOLA SIGNAL
VERTICAL SAWTOOTH SIGNAL
HORIZONTAL SAWTOOTH SIGNAL

Fig. 8-3 Red Shading Correction Signal Generator Circuit

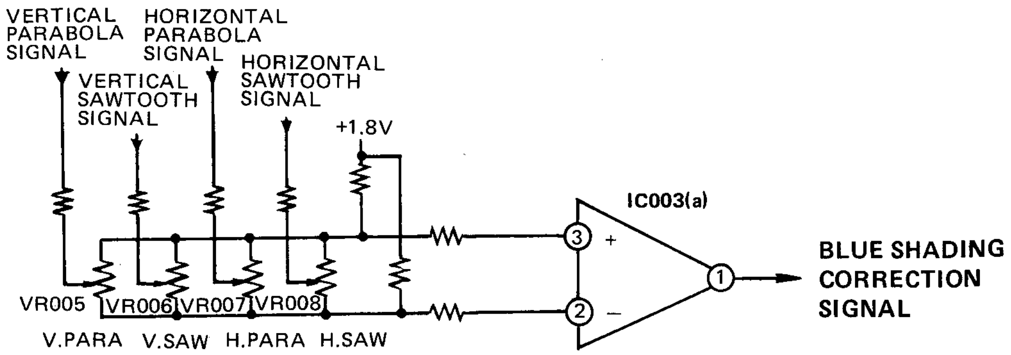

VERTICAL PARABOLA SIGNAL
HORIZONTAL PARABOLA SIGNAL
VERTICAL SAWTOOTH SIGNAL
HORIZONTAL SAWTOOTH SIGNAL
+1.8V
IC003(a)
3
+
1
2
-
BLUE SHADING CORRECTION SIGNAL
VR005
VR006
VR007
VR008
V.PARA
V.SAW
H.PARA
H.SAW

Fig. 8-4 Blue Shading Correction Signal Generator Circuit

8-5 Dynamic Focus Correction Signal Generator Circuit

Outline

Refer the 4-13. Correction Signal Generator Circuit on page 43.

Details

The vertical sawtooth signal from pin 1 of sawtooth generator IC001 (a), the vertical parabola signal from pin 7 of parabola generator IC001 (b), the horizontal sawtooth signal from pin 1 of sawtooth generator IC002 (a), the horizontal parabola signal from pin 7 of parabola generator IC002 (b) to the wiper arms of dynamic focus correction control VR009 (V.PARABOLA), VR010 (V.SAWTOOTH), VR011 (H.PARABOLA) and VR012 (H.SAWTOOTH) respectively.

These waveforms are applied to both the ivnerted (pin 2) and non-inverted (pin 3) inputs of IC004 (a), where they are amplified.

The output of IC004 (a) at pin 1 produces a positive negative dynamic focus correction signal which depends on the position of these controls and it is fed to the correction signal generator circuit on the process board.

Note : Dynamic focus should be adjusted when color non-uniformity is seen in the picture of a white card after bias light shading is properly adjusted and after electrical focus and beam alignment are correctly set.

To judge whether the camera needs this adjustment, signal shading potentiometers VR001, VR002, VR003, VR004 (RED SHADING CORRECTION) and VR005, VR006, VR007, VR008 (BLUE SHADING CORRECTION) on shading correction board must be at their mechanical centers.

Be aware that proper beam alignment has greater contribution to color uniformity than dynamic focus even through it is more difficult to achieve in a hurry.

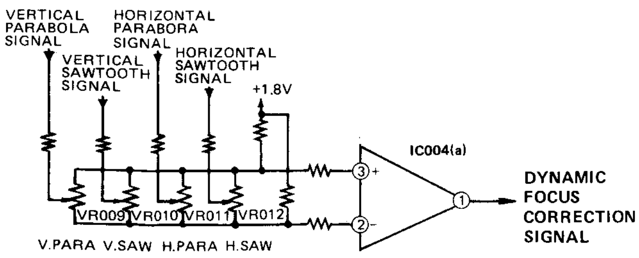

VERTICAL PARABOLA SIGNAL
HORIZONTAL PARABORA SIGNAL
VERTICAL SAWTOOTH SIGNAL
HORIZONTAL SAWTOOTH SIGNAL
+1.8V
IC004(a)
③+
②-
①
VR009
VR010
VR011
VR012
V.PARA V.SAW H.PARA H.SAW
DYNAMIC FOCUS CORRECTION SIGNAL

Fig. 8-5 Dynamic Focus Correction Signal Generator Circuit

8-6 Bias Light Shading Correction Signal Genrator Circuit

Outline

Refer the 4-13. Correction Signal Generator Circuit on page 43.

Details

The horizontal sawtooth signal from pin 1 of sawtooth generator IC002 (a), the horizontal prarbola signal from pin 7 of parabola generator IC002 (b) to the wiper arms of bias light shading correction control VR013 (H.SAWTOOTH) and VR014 (H.PARABOLA) respectively.

These waveforms are applied to both the inverted (pin 6) and non-inverted (pin 5) inputs of IC004 (b), where they are amplified.

The output of IC004 (b) at pin 7 produces a positive or negative bias light shading correction signal which depends on the position of these controls and it is fed to the correction signal generator circuit on the process board.

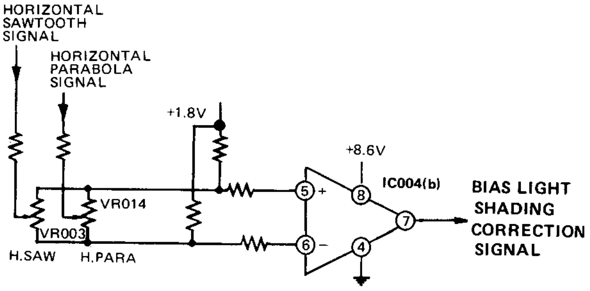

HORIZONTAL SAWTOOTH SIGNAL
HORIZONTAL PARABOLA SIGNAL
+1.8V
+8.6V
IC004(b)
⑤+
⑥-
⑧
④
⑦
VR014
VR003
H.SAW H.PARA
BIAS LIGHT SHADING CORRECTION SIGNAL

Fig. 8-6 Bias Light Shading Correction Signal Generator Circuit

ORDER NO. VKD82070644C4

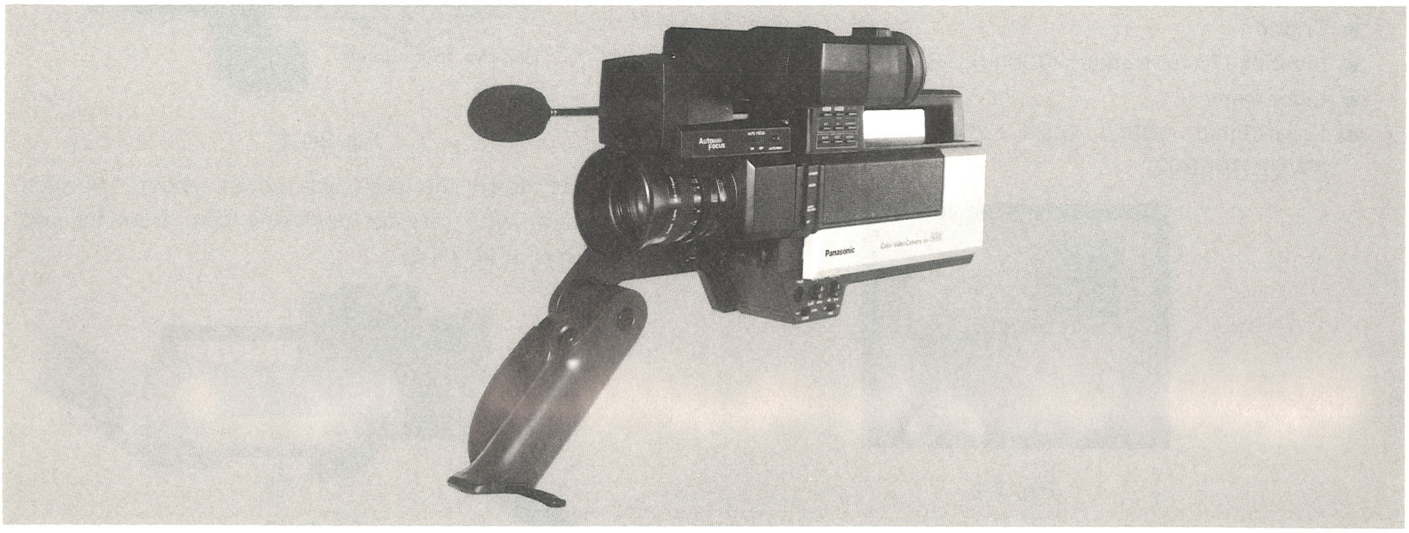
Service Manual

Vol. 2

Adjustment Procedures

Color Video Camera

WV-4850



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Panasonic®

Panasonic Tokyo
Matsushita Electric Industrial Co., Ltd.
1-2, 1-chome, Shibakoen, Minato-ku, Tokyo 105 Japan

1 TEST EQUIPMENT REQUIRED

The following equipment is required for adjustment of WV-4850 color camera.

- Oscilloscope
  (dual trace, delayed, 25MHz bandwidth, with three proves, one must be 1:1)
- Digital voltmeter (DVM)
- Frequency counter
- Vectorscope
- Color video monitor
- Tripod
- Lighting (70 footcandles (700 lux), 3200°K)
- Light meter
- Logarithmic gray scale chart (Parts No. YWV2310RB99)

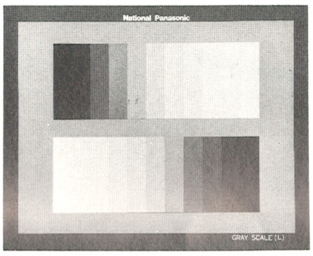

National Panasonic
GRAY SCALE (L)

Fig. 1-1

Color chart (Parts No. YWV2100RB98)

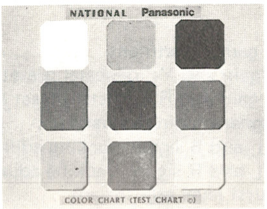
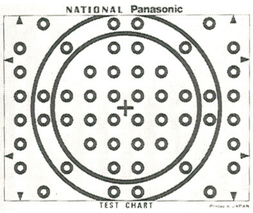

NATIONAL Panasonic
COLOR CHART (TEST CHART c)

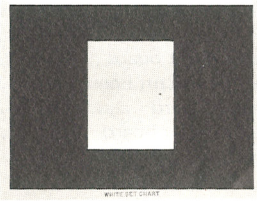
Fig. 1-2

- Ball chart (Parts No. YWV2100RB03)


NATIONAL Panasonic
TEST CHART

FRONT

Fig. 1-3


WHITE SET CHART

REAR

Fig. 1-4

Test equipment denoted by shading not required for pick-up tube replacement only.

2 DISASSEMBLY PROCEDURE FOR ADJUSTMENT

2-1 Camera Unit

- Turn the power off.
- Remove the two screws on the bottom of each side cover holding the both side covers. (Fig. 2-1-1)

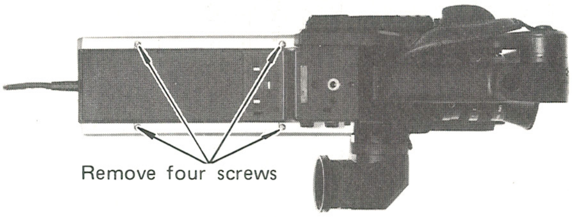

Remove four screws

Fig. 2-1-1

- Slide down the both side covers about 1/4 inch (5mm) with care for unlocking them from the top covers. (Fig. 2-1-2)

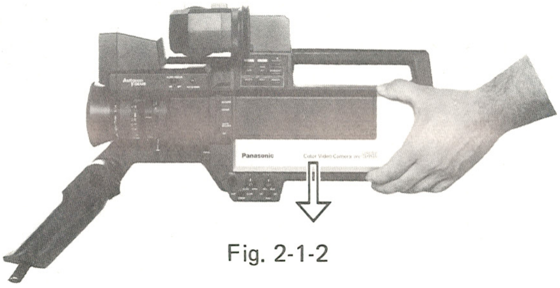


Fig. 2-1-2

- Both side covers may be removed by pulling them outward.
- Remove three screws which hold the printed circuit board (PCB) in order to gain access to the desired circuitry.

(A) For left side PCB (viewed from the front)
Deflection Circuit Board (YFVPKB4850JA)

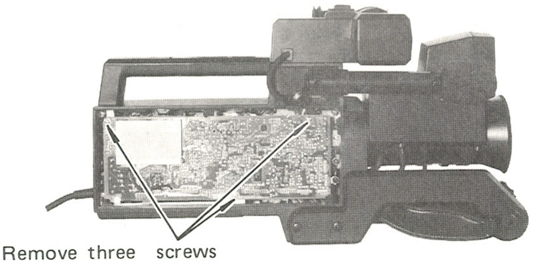

Remove three screws

Fig. 2-1-3

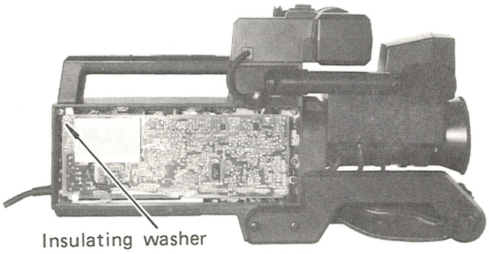

Insulating washer

Fig. 2-1-4

Note : When reinstalling the deflection circuit board, make sure that the insulating washer is attached at the PCB.

(B) For right side PCB (viewed from the front)

Process Circuit Board (YFVPKC4850JA)

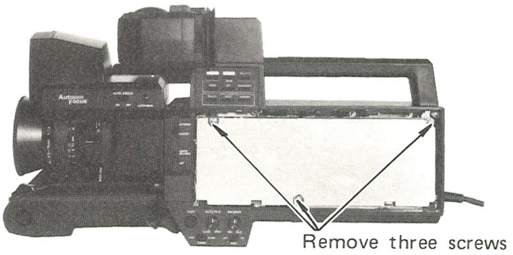

Remove three screws

Fig. 2-1-5

Note : When reinstalling the process circuit board, make sure that the insulating washers are attached at the PCB.

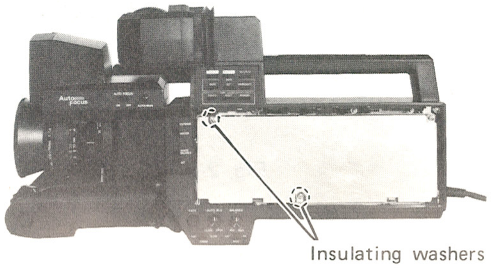

Insulating washers

Fig. 2-1-6

2-2 Microphone Unit

- Remove the screw on the microphone and slide back the microphone to release the lock.
- Disconnect CN006 on the deflection circuit board and remove the microphone by pulling the microphone outward.

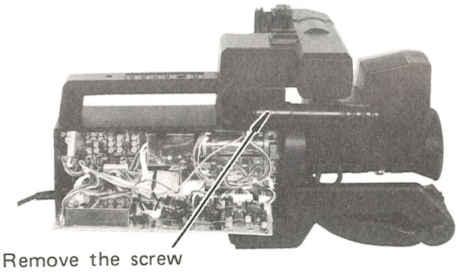

Remove the screw

Fig. 2-2-1

2-3 Viewfinder Unit

- Disconnect the viewfinder connector from the camera. (Fig. 2-3-1)

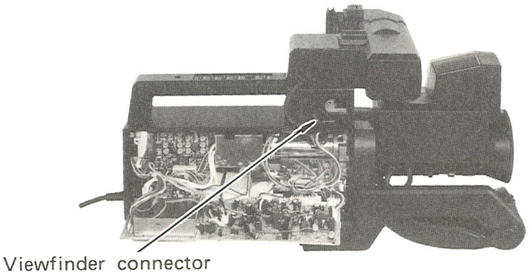

Viewfinder connector

Fig. 2-3-1

- While pushing the EVF lock knob on viewfinder, remove the viewfinder from camera unit by sliding it frontward. (Fig. 2-3-2)

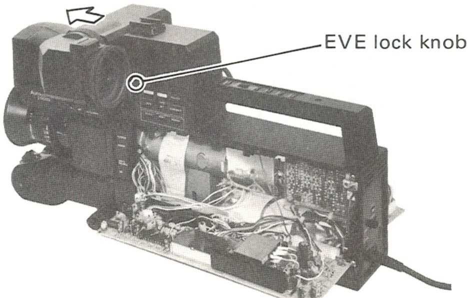

EVE lock knob

Fig. 2-3-2

- Loosen the viewfinder case holder ring by turning it counterclockwise. (Fig. 2-3-3)

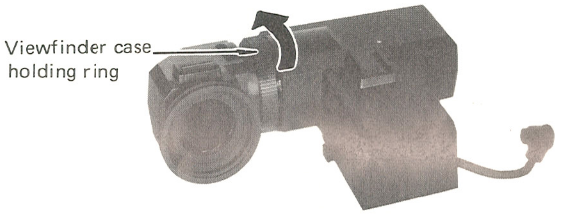

Viewfinder case holding ring

Fig. 2-3-3

- Remove the two screws on the bottom and remove the bottom cover. (Fig. 2-3-4, Fig. 2-3-5)

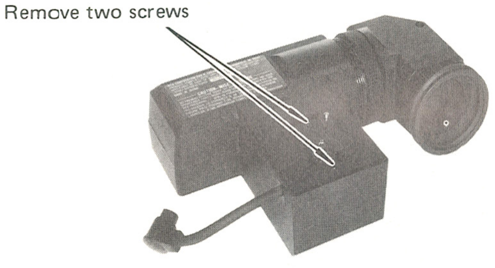

Remove two screws

Fig. 2-3-4

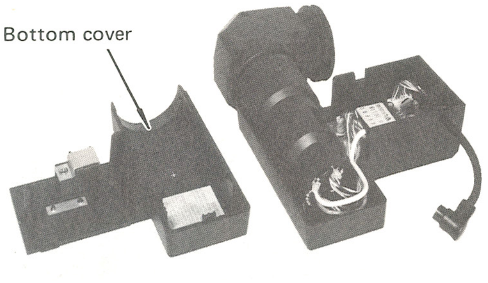

Bottom cover

Fig. 2-3-5

Note : When reinstalling the bottom cover, make sure that the plate spring is attached on the top cover. (Fig. 2-3-5)

- Remove the screw on the top side of CRT case. (Fig. 2-3-6)

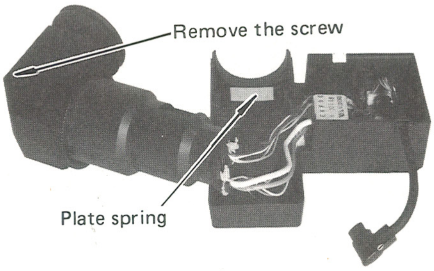

Remove the screw
Plate spring

Fig. 2-3-6

- Slide and set the viewfinder case holding ring at the outside of CRT case. (Fig. 2-3-7)
- Remove the bottom side of CRT case with care for unlocking the case from the top side of CRT case. (Fig. 2-3-7)

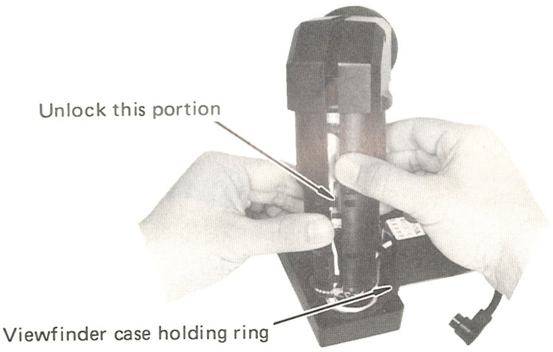

Unlock this portion
Viewfinder case holding ring

Fig. 2-3-7

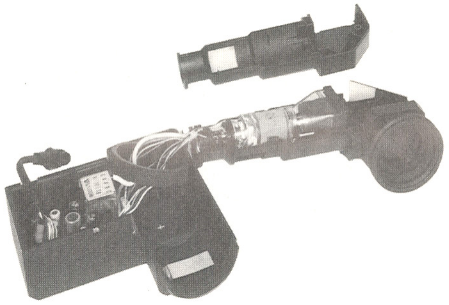


Fig. 2-3-8

Note : Make sure that the wires connecting the CRT socket assembly and printed circuit board are put into the ditch portion of the bottom case. (Fig. 2-3-9)

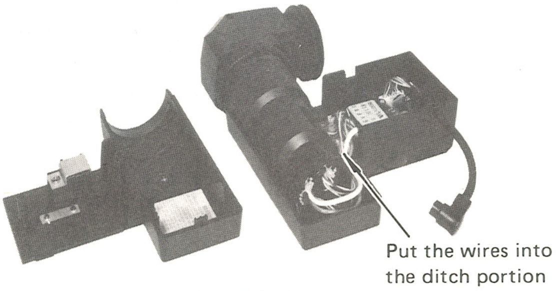

Put the wires into the ditch portion

Fig. 2-3-9

2-4 Auto Focus Lens-1

Right side case removal

- Remove the two screws on the handle grip and remove the handle grip from the camera.
- Disconnect the two connectors on the front portion of the camera.
- Remove the lens.

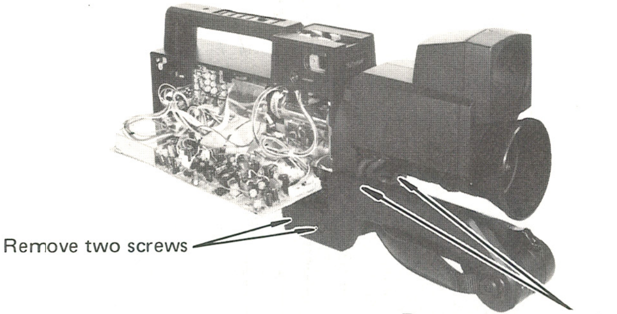

Remove two screws
Remove two connectors

Fig. 2-4-1

- Remove the lens hood.
- Remove the three screws on the front portion of cover and remove the cover by pulling it frontward with care for unlocking the cover from the case. (Fig. 2-4-2)

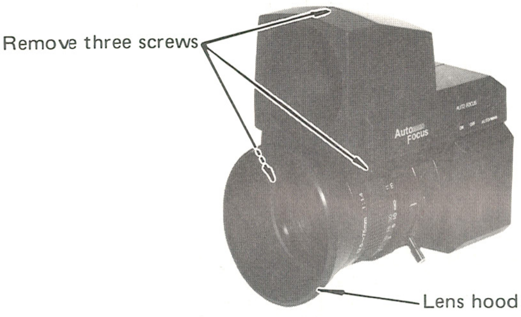

Remove three screws
Lens hood

Fig. 2-4-2

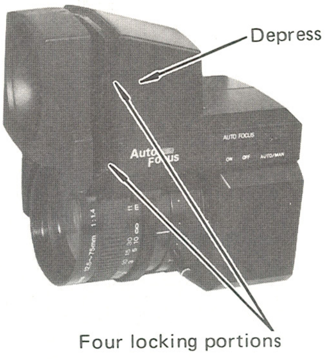

Depress
Four locking portions

Fig. 2-4-3

- Remove the two screws on the right of the side case and remove the case by pulling outward with care for unlocking the case from the left side of the case. (Fig. 2-4-4 & 2-4-5)

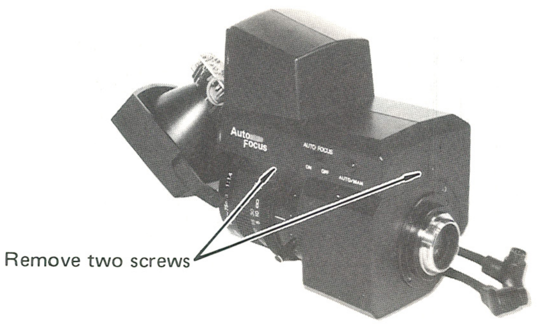


Fig. 2-4-4

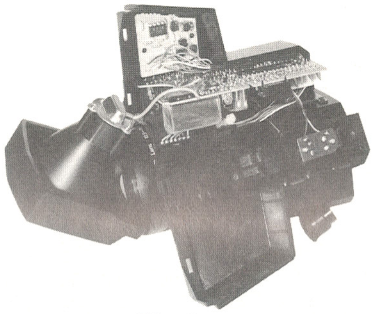


Fig. 2-4-5

- Remove the two screws on the auto/man switch circuit board and remove the auto/man switch circuit board from the case. (Fig. 2-4-6)

  Note : When installing the right of the side case, make sure that the auto focus circuit board end is put into the ditch of the case.

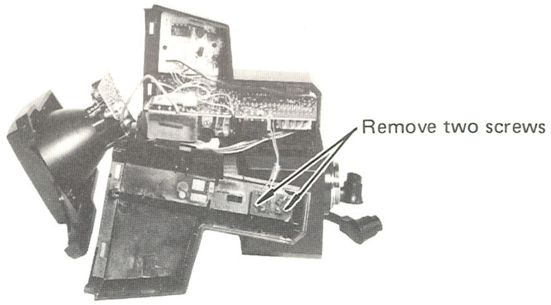


Fig. 2-4-6

- Install the front portion of the cover with the two screws for gain adjustment. (Fig. 2-4-7)
- Install the lens.

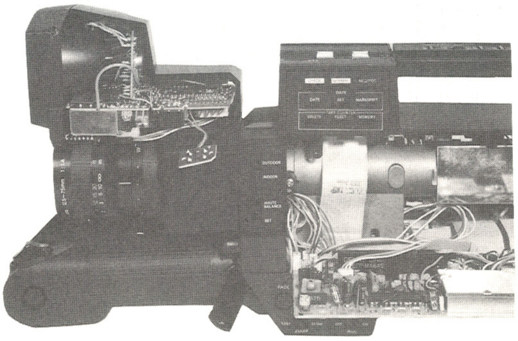


Fig. 2-4-7

2-5 Auto Focus Lens-2

Auto Focus Circuit removal

- Remove the front portion of the cover and right side of the case as described in section 2-4 "Auto Focus Lens-1" on page 3.
- Remove the three screws on the left side of the case and remove the auto focus circuit board with care from the lens unit. (Fig. 2-5-1 & 2-5-2)

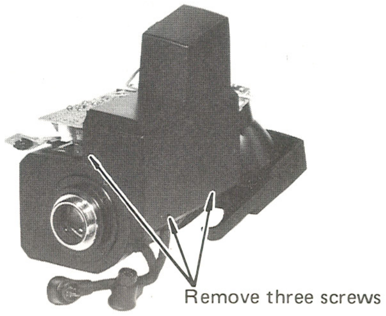


Fig. 2-5-1

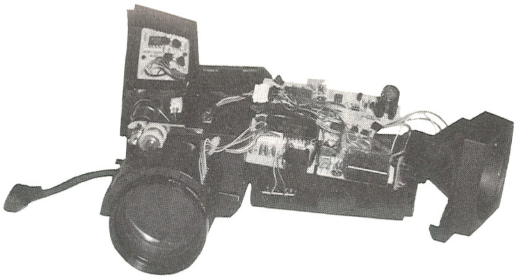


Fig. 2-5-2

- Remove the auto focus circuit board from the case by pulling it outward.

3 PICK-UP TUBE REPLACEMENT

- Disassemble the camera as described in Section 2 "DISASSEMBLY PROCEDURE FOR ADJUSTMENT" on page 1.
- Push the connector panel downward and remove the connector panel from chassis by pulling it outward. (Fig. 3-1)

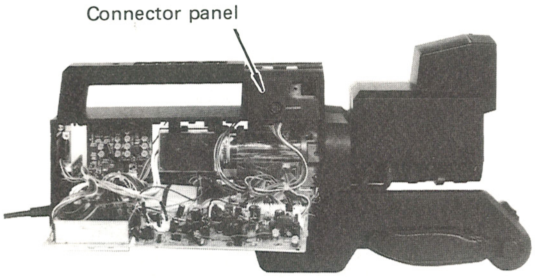

Connector panel

Fig. 3-1

- Remove the two screws holding the pick-up tube socket shield case B and two ground leads from process circuit board and deflection circuit board. And remove the shield case A and B after pulling it back a little. (Fig. 3-2)

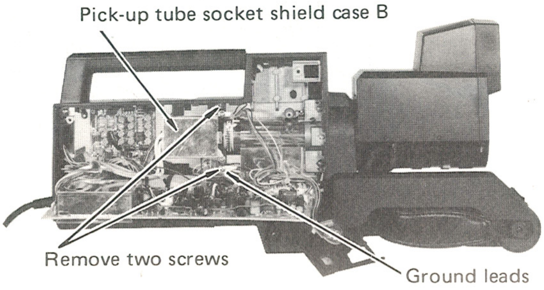

Pick-up tube socket shield case B
Remove two screws
Ground leads

Fig. 3-2

- Remove the two screws on the coil holder B and remove the two ground leads for deflection coil and pick-up tube socket. (Fig. 3-3)
- Disconnect the pick-up tube socket and bias light assembly from the pick-up tube. (Fig. 3-3)
- Remove the two screws on the coil holder A, and remove the coil holder A and backfocus adjusting pin. (Fig. 3-3)

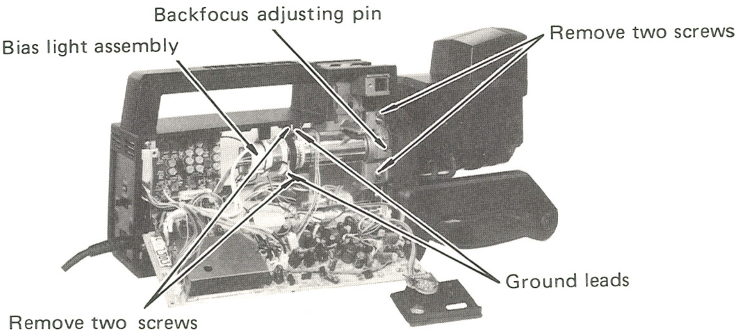

Backfocus adjusting pin
Bias light assembly
Remove two screws
Ground leads
Remove two screws

Fig. 3-3

- Remove the two screws which hold the shield plate for preamplifier circuit board and remove the shield plate. (Fig. 3-4)

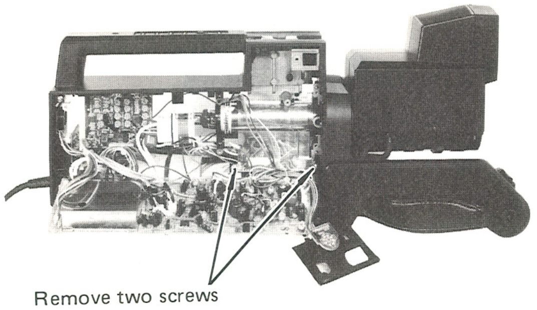

Remove two screws

Fig. 3-4

- Disconnect the deflection coil connector CN004 from the deflection circuit board and unsolder the target lead from the preamplifier circuit board. (Fig. 3-5)

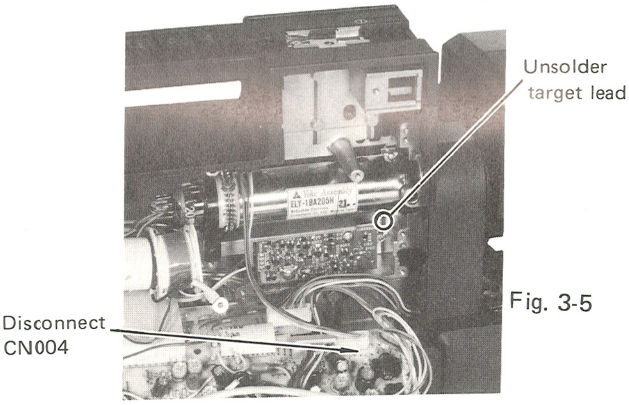

Unsolder target lead
Disconnect CN004

Fig. 3-5

- Remove the deflection coil together with the coil holder B from the chassis by pulling it backward. (Fig. 3-6)
- Remove the filter assembly from the deflection coil.
- Loosen the pick-up tube holding screw and push out the pick-up tube.

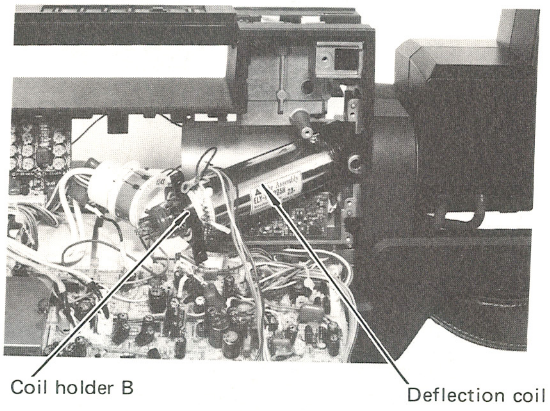

Coil holder B
Deflection coil

Fig. 3-6

- Clean the pick-up tube faceplate with the lens cleaning tissue or cloth.
- Insert the new pick-up tube into the deflection coil and push it completely until it stops.

  Note : 1. When inserting the pick-up tube in place, be careful not expose the target directly to bright light.

  2. Make sure that the pick-up tube is in the correct direction, i.e., the optical black on the pick-up tube is on the right and perpendicular to the horizontal line between the arrows on the pick-up tube as shown below. (Fig. 3-7)

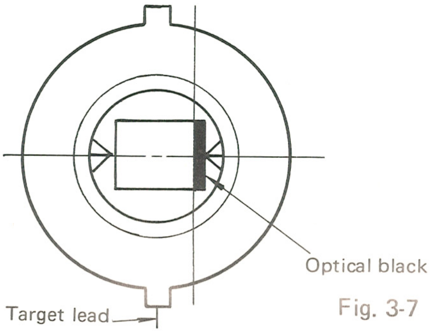

Optical black
Target lead

Fig. 3-7

- Install the filter assembly on the deflection coil.
- Tighten the pick-up tube holding screw to secure the pick-up tube in place.
- Install the pick-up tube with deflection coil into the chassis.

  Note : 1. The target lead has to be positioned downward.

  2. Make sure that the protruding part of the deflection coil engages the recessed part of the chassis. (Fig. 3-8)

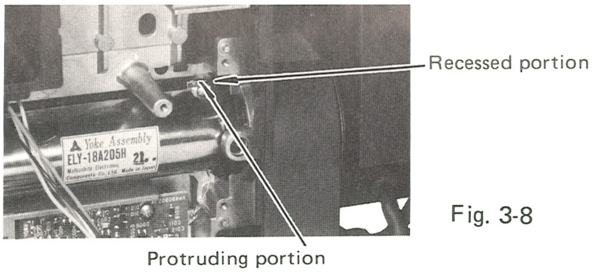

Recessed portion
Yoke Assembly
ELY-18A205H
Protruding portion

Fig. 3-8

- Attach the coil holder B to the deflection coil (Fig. 3-9) and hold it with one screw.

  Note : When attaching the coil holder B, also fix the ground lead for the deflection coil. (Fig. 3-10)

- Attach the bias light assembly and the pick-up tube socket to the pick-up tube.
- Fix the ground lead for the pick-up tube socket.

  Note : 1. When attaching the bias light assembly to the pick-up tube socket, the connector leads have to be positioned downward.

  2. Make sure that the recessed part of the bias light assembly engages the protruding part of the pick-up tube socket.

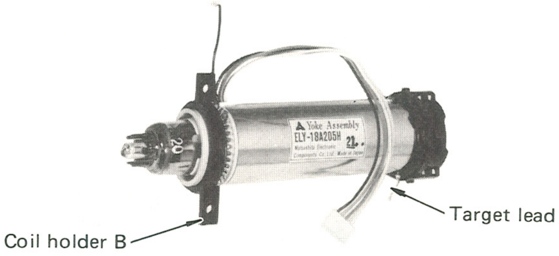

Yoke Assembly
ELY-18A205H
Target lead
Coil holder B

Fig. 3-9

- Solder the target lead.
- Attach the shield plate for preamplifier with the two screws. (Fig. 3-10)

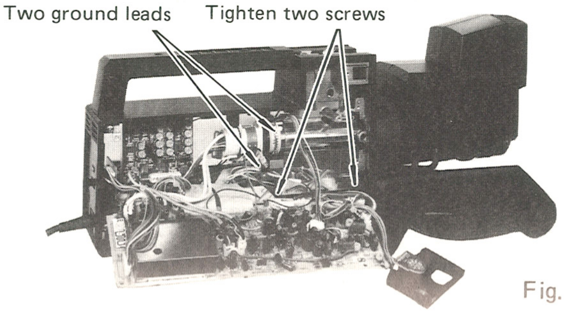

Two ground leads
Tighten two screws

Fig. 3-10

- Align the ditch on the front portion of the deflection coil with the hole for the backfocus adjusting pin by moving the deflection coil. (Fig. 3-11)

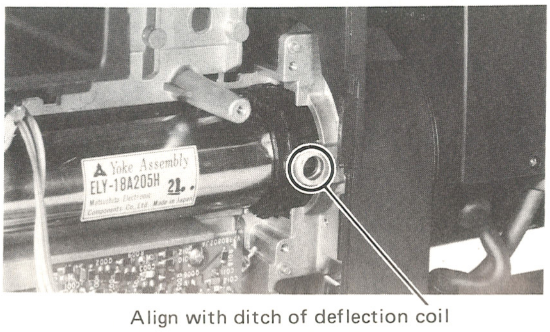

Yoke Assembly
ELY-18A205H
Align with ditch of deflection coil

Fig. 3-11

- Insert the backfocus adjusting pin into the hole and confirm that the deflection coil moves back and forth by turning the backfocus adjusting pin. (Fig. 3-12)

  Note : The eccentric pin side of backfocus adjusting pin should be inserted into the hole.

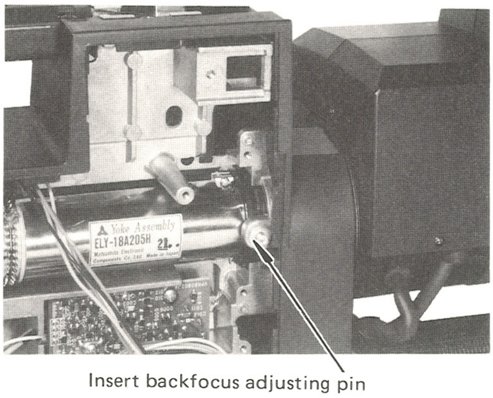

Yoke Assembly
ELY-18A205H
Insert backfocus adjusting pin

Fig. 3-12

- Install the coil holder A to the chassis with the two screws. (Fig. 3-13)
- Connect the deflection coil connector CN004 to the deflection circuit board.

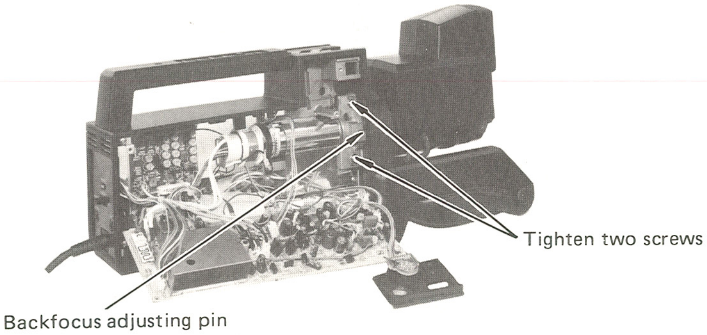

Tighten two screws
Backfocus adjusting pin

Fig. 3-13

- When installing the pick-up tube socket shield case A and B, install the two ground leads for the deflection circuit board and process circuit board. (Fig. 3-14)

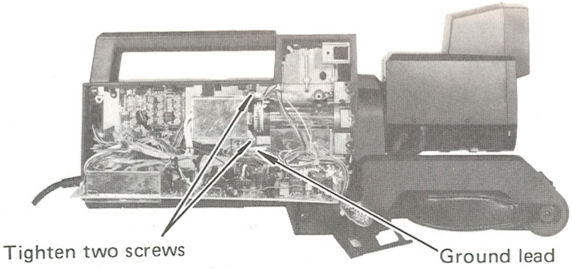

Tighten two screws
Ground lead

Fig. 3-14

- After replacing the pick-up tube, adjust the camera according to Section 4 "ADJUSTMENT PROCEDURE" on page 8.

4 ADJUSTMENT PROCEDURE

4-1 Connection and Setting Up for Adjustment

Connection

- Connect the camera cable from the camera to the power supply.
- Connect the video cable from the power supply to the color monitor.
- Terminate the color monitor video input in 75 ohms.

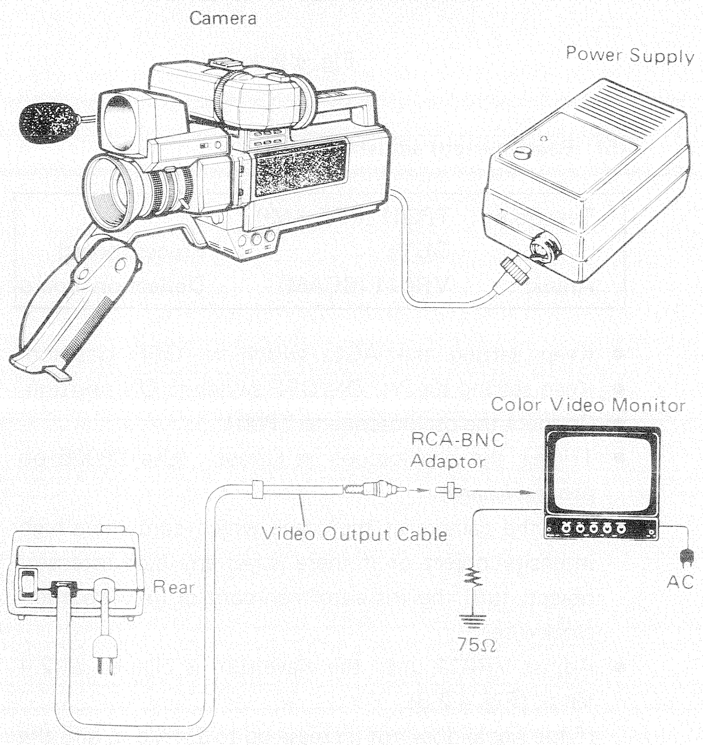


Fig. 4-1-1

Disassembling

- Disassemble the camera while referring to Section 2. "DISASSEMBLY PROCEDURE FOR ADJUSTMENT" on page 1.

Setting up

- Light : Incident light intensity on chart : 70 foot-candles (700 lux)
  Color temperature : 3200°K
- Test Charts : Logarithmic gray scale chart (YWV2310RB99)
  Color chart (YWV2100RB98)
  Flat white chart
  Ball chart (YWV2100RB03)

Steps denoted by shading need not be performed for pick-up tube replacement only.

Position of controls and switches on the camera

- Set the controls and switches on the camera as follows;

Indoor/Outdoor switch	Lower (INDOOR) position
White balance switch	Upper (WHITE BALANCE) position
Iris auto/man control	Center position
Color adjustments control	Center (BALANCE) position
Standby power switch	Right (ON) position
AGC ON/OFF switch	Right (ON) position
YL ON/OFF switch (SW001 on process board)	ON position

Note : TP in this manual refers to a test point on the printed circuit board.

4-2 Camera Unit Adjustment

- Refer to page 21 and 22 for the test points and adjusting controls.

(1) +4.8V adjustment

Test point :	TP002 (+ 4.8V)	Deflection board
Adjust :	VR001 (+ 4.8V)	Deflection board

- Cap on the lens.
- Set the AGC switch to OFF position.
- Set the YL ON/OFF switch to ON position.
- Connect the digital voltmeter to the TP002.
- Adjust VR001 for 4.8V ± 0.01V.

(2) 3.58MHz adjustment

Test point :	Pin 5 of IC11	Process board
Adjust :	CT003 (3.58MHz ADJ)	Process board

- Connect the frequency counter to pin 5 of IC11.
- Adjust CT003 for 3.57954MHz ± 10Hz.

(3) Target adjustment

Test point :	TP006 (TARGET)	Deflection board
Adjust :	VR007 (TARGET)	Deflection board

- Connect the digital voltmeter to the TP006.
- Adjust VR007 so that the voltage is equal to "Esj + 0.7"V.

Note : 1. The target voltage of pick-up tube should be adjusted in the normal room temperature. (77° ± 9°F (25° ±5°C))

2. The value of optimum target voltage Esj is stamped on the pick-up tube neck. In order to check the Esj value of pick-up tube already inserted into the deflection coil assembly, the pick-up tube socket and bias light assembly should be removed after removing the pick-up tube socket shield case B by unscrewing the two screws. (Fig. 4-2-1)

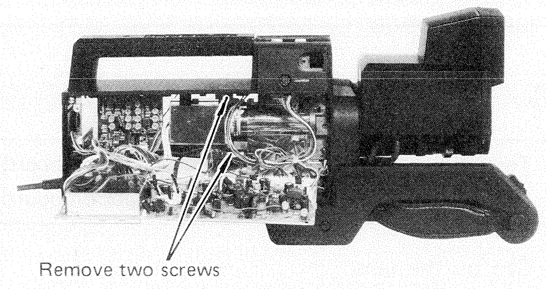


Fig. 4-2-1

(4) Bias light adjustment

Test point :	TP001 (PRE AMP OUT)	Process board
Adjust :	VR010 (BIAS LIGHT)	Deflection board

- Keep setting the AGC switch to OFF position.
- Keep setting the Y_L ON/OFF switch to ON position.
- Cap on the lens.
- Connect the oscilloscope to TP001.
- Trigger the oscilloscope at H.rate. (Use TP005 on process board)
- Adjust VR010 so that the bias current is 70mV. (Fig. 4-2-2)

Note : If there is bias light (current) shading, adjust the level at the center of the waveform.

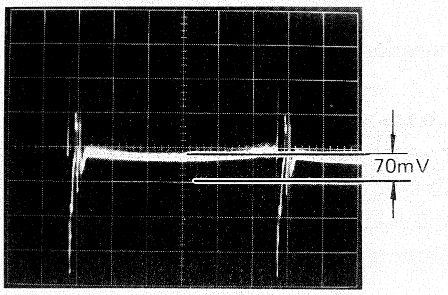


Fig. 4-2-2

(5) Beam current adjustment

Test point :	TP001 (PRE AMP OUT)	Process board
Adjust :	VR011 (BEAM)	Deflection board

- Keep setting the AGC switch to OFF position.
- Keep setting the Y_L ON/OFF switch to ON position.
- Connect the oscilloscope to TP001.
- Trigger the oscilloscope at H.rate. (Use TP005 on process board)
- Aim the camera at the scene which contains a high intensity object or if there is not any high intensity object, turn the iris auto/man control fully counter-clockwise.
- Adjust VR011 until the waveform is clipped at 2.4 Vp-p. (Fig. 4-2-3)

  If the signal does not increase up to 2.4 Vp-p, aim the camera at a brighter object.
- Reset the iris auto/man control to center position.

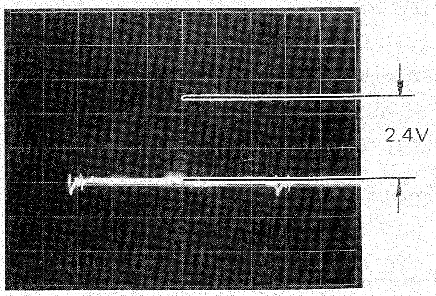
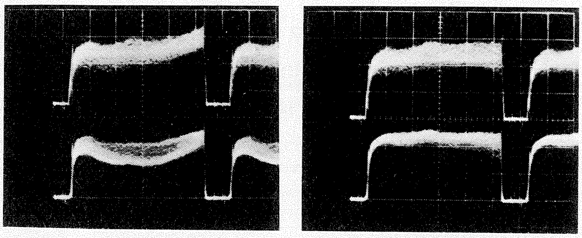


Fig. 4-2-3

(6) Beam alignment adjustment

Test points :	Pin 1 of CN007 (R)	Process board
	Pin 3 of CN007 (B)	Process board
Adjust :	VR015 (Focus)	Deflection board
	Alignment magnets	Coil assembly
Observe :	Color monitor	

- Keep setting the AGC switch to OFF position.
- Set the YL ON/OFF switch to OFF position.
- Aim the camera at the white chart.
- Connect the oscilloscope to pins 1 (R) and 3 (B) of CN007.
- Trigger the oscilloscope at H.rate. (Use TP005 on Process board)
- Turn DYNAMIC FOCUS VR009 to VR012 to their mechanical center.
- Also turn RED SIGNAL SHADING VR001 to VR004 and BLUE SIGNAL SHADING VR005 to VR008 to their mechanical center.
- While observing the color monitor, adjust VR015 for minimum green tint in the center.
- At this time, the center portion of B and R signal waveforms at pins 1 and 3 of CN007 become maximum.



NO GOOD GOOD

Fig. 4-2-4

- Then while watching the color monitor, rotate the alignment magnets for minimum green tint in the center and maximum magenta (red) throughout the picture area.
  At this time, the waveform peaks of R and B signals are same in phase and maximum in amplitude. (Fig. 4-2-5 & 4-2-6)

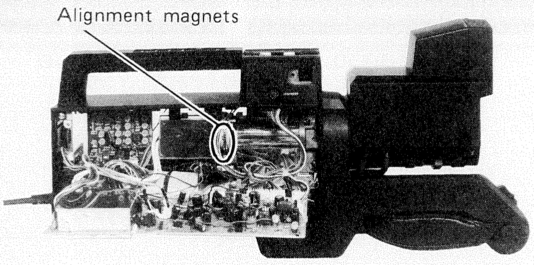
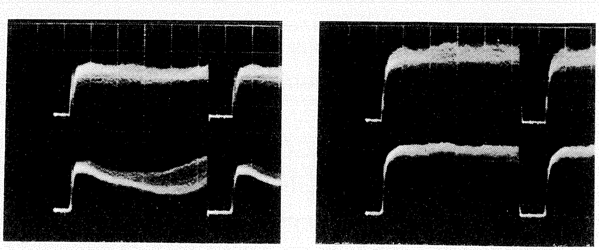


Fig. 4-2-5



NO GOOD GOOD

Fig. 4-2-6

- Overall focus is affected by the beam alignment adjustment so readjust VR015 occasionally while performing beam alignment adjustment.
- If a bright green area appears at the corner of the monitor, readjust the beam alignment with the alignment magnets.
- If green tinted areas still remain after repeating the beam alignment, they will be minimized by the dynamic focus and signal shading adjustments which follow.

(7) Focus coarse adjustment

Adjust :	VR015 (FOCUS)	Deflection board
Observe :	Color monitor	

- Keep setting the AGC switch to OFF position.
- Set the YL ON/OFF switch to ON position.
- Aim the camera at the white chart.
- While observing the color monitor, adjust VR015 for minimum green tint throughout picture area.

(8) Backfocus adjustment

Adjust :	Backfocus adjusting pin
Observe :	Color monitor

- Keep setting the AGC switch to OFF position.
- Keep setting the YL ON/OFF switch to ON position.
- Aim the camera at an object further than 6 feet (2m) from the camera.
- Loosen the two backfocus fixing screws slightly. (Fig. 4-2-7)
- Zoom in (close up/telephoto) and adjust the lens focus.
- Zoom out (wide angle) and adjust the focus by turning the backfocus adjusting pin. (Fig. 4-2-7)

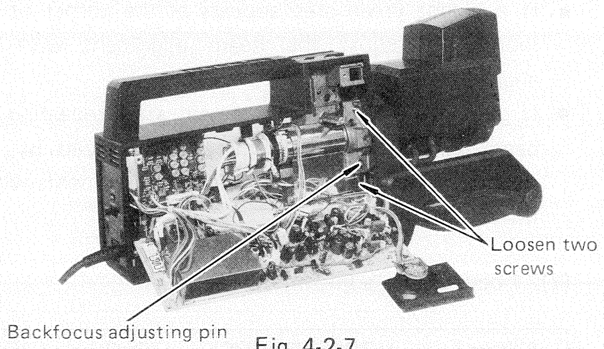


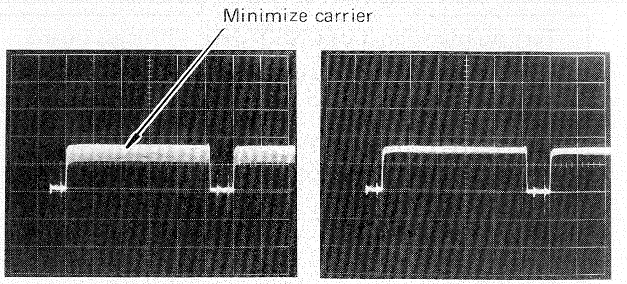
Fig. 4-2-7

- Zoom in again and adjust the focus by turning the lens focus.
- Zoom out again and adjust the focus by turning the backfocus adjusting pin.
- Repeat this procedure until the focus tracks throughout the zoom range.

(9) Horizontal size, horizontal linearity and vertical size adjustment

Test points :	TP002 (YH)	Process board
	TP001(PRE AMP OUT)	Process board
Adjusts :	VR002 (H SIZE)	Deflection board
	VR003 (H LIN-2)	Deflection board
	L007 (H LIN-1)	Deflection board
	VR005 (V SIZE)	Deflection board

- Keep setting the AGC switch to OFF position.
- Keep setting the YL ON/OFF switch to ON position.
- Aim the camera at the white chart.
- Connect the oscilloscope to TP002.
- Trigger the oscilloscope at H.rate. (Use TP005 on process board)
- Adjust VR002 so that the carrier (3.58MHz) on the center portion of the YH signal at TP002 minimum. (Fig. 4-2-8)
- Adjust L007 so that the carrier (3.58MHz) on the YH signal is minimum.



NO GOOD GOOD

Fig. 4-2-8

- Adjust VR003 so that the starting portion of YH signal at TP002 is flat.

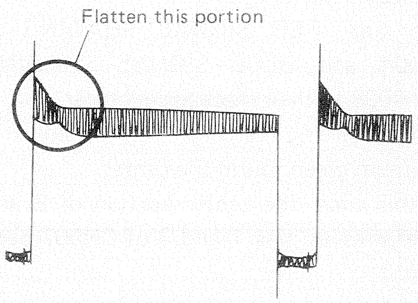
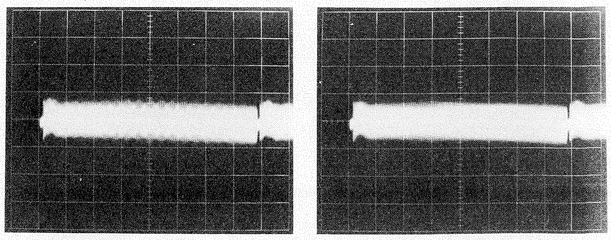


Fig. 4-2-9

- Repeat adjusting L007 and VR003 until the carrier on the YH signal is minimum, the starting portion of YH signal is flat and picture has minimum disturbance on the left side.
- Connect the oscilloscope to TP001.
- Trigger the oscilloscope at V.rate. (Use TP006 on process board)
- Adjust VR005 for minimum beat during the vertical period. (Fig. 4-2-10)



NO GOOD GOOD

Fig. 4-2-10

(10) Vertical centering adjustment

Test point :	TP001 (PRE AMP OUT)	Process board
Adjust :	VR004 (H CENT)	Deflection board
	VR006 (V CENT)	Deflection board

- Keep setting the AGC switch to OFF position.
- Keep setting the YL ON/OFF switch to ON position.
- Aim the camera at the white chart.
- Connect the oscilloscope to TP001.
- Trigger the oscilloscope at V.rate. (Use TP006 on process board)
- Turn VR004 fully clockwise.
  The optical black and arrow marker appear on the right side of the picture.
- While observing the waveform, adjust VR006 so that the marker which shows the vertical center of pick-up tube positions at the center of video signal waveform in vertical rate. (Fig. 4-2-11)

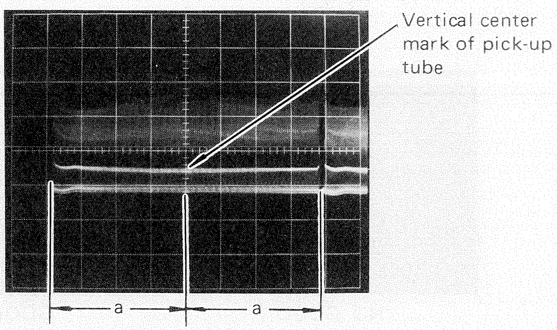


Fig. 4-2-11

Note : When adjust the vertical centering using with the underscanning monitor, adjust VR006 so that the arrow marker shows the vertical center of the monitor.

- Turn back VR004 until the optical black and arrow marker disappear.

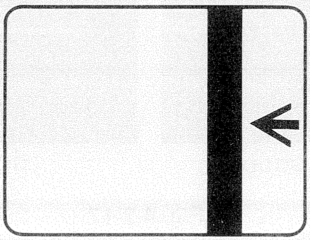


Fig. 4-2-12

(11) Horizontal centering adjustment

Test points :	TP001 (PRE AMP OUT)	Process board
	TP005 (Hs)	Process board
Adjust :	VR004 (H CENT)	Deflection board

- Keep setting the AGC switch to OFF position.
- Keep setting the YL ON/OFF switch to ON position.
- Aim the camera at the white chart.
- Connect the oscilloscope to TP001 and TP005.
- Trigger the oscilloscope at H.rate. (Use TP005 on process board)
- Expand the horizontal blanking period on the oscilloscope.
- Adjust VR004 until the optical black width is 3.5 µsec. (Fig. 4-2-13)
  If the falling edge of the waveform corresponding to the picture is noisy, adjust for the middle.
  When if falling edge of the waveform for optical black is not narrow, turn the pick-up tube.

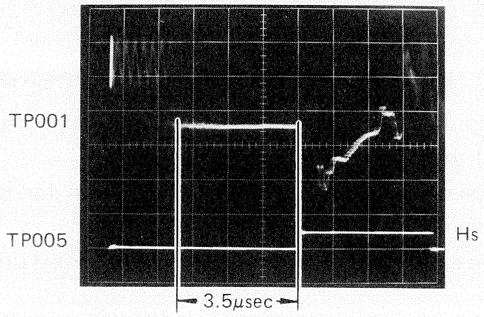


Fig. 4-2-13

(12) Bias light shading adjustment

Test point :	TP009 (NTSC)	Process board
Adjusts :	VR013 (H.SAWTOOTH)	Shading board
	VR014 (H.PARABOLA)	Shading board

- Set the AGC switch to ON position.
- Keep setting the YL ON/OFF switch to ON position.
- Cap on the lens.
- Connect the oscilloscope to TP009.
- Trigger the oscilloscope at H.rate. (Use TP005 on Process board)
- While watching the waveform, adjust VR013 and VR014 to make dark current waveform as flat as possible. (Fig. 4-2-14)

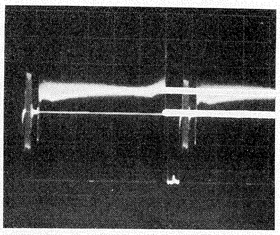


Fig. 4-2-14

(13) Dynamic focus adjustment

Adjusts :	VR015 (FOCUS)	Deflection board
	VR009 (V.PARABOLA)	Shading board
	VR010 (V.SAWTOOTH)	Shading board
	VR011 (H.PARABOLA)	Shading board
	VR012 (H.SAWTOOTH)	Shading board
Observe :	Color monitor	

- Keep setting the AGC switch to ON position.
- Keep setting the YL ON/OFF switch to ON position.
- Aim the camera at the white chart.
- Observe the color monitor, and adjust VR015 for minimum green in the center and maximum magenta (red) throughout the picture area.
- Increase the color monitors chroma gain for better viewing.

  Make sure that the color monitor is converged properly.
- Adjust VR009 to VR012 to minimize the green tint in the corners and edges of picture.

Note : 1. Overall focus is affected by the dynamic focus adjustment so readjust VR015 occasionally while performing the dynamic focus adjustment.

2. The object of this adjustment is to optimize overall focus, especially at the picture edges and corners.

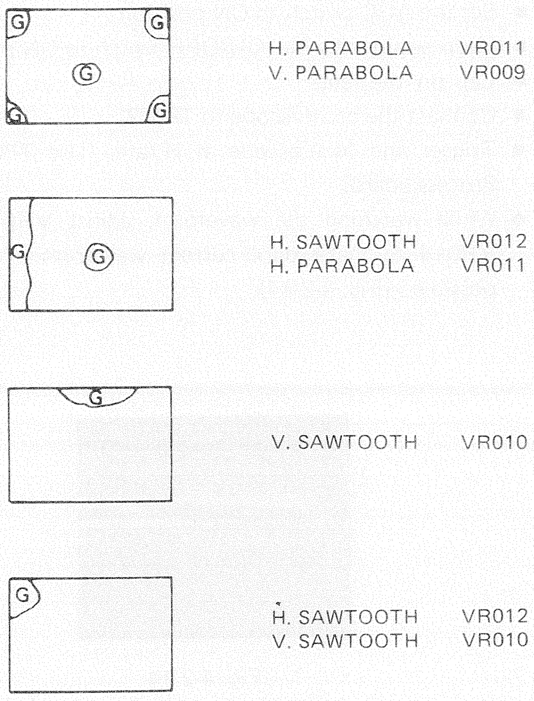
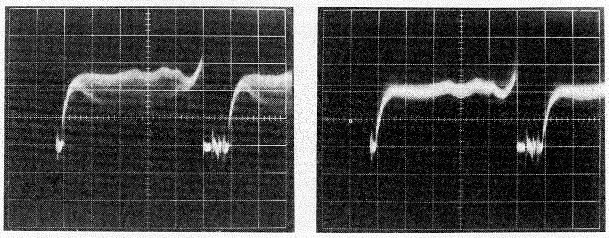


Fig. 4-2-15

(14) Optical black (OB) correction and OB offset adjustment

Test point :	TP002 (YH)	Process board
Adjusts :	VR012 (OB CORRECTION SAW)	Deflection board
	VR013 (OB CORRECTION PARA)	Deflection board
	VR014 (OB OFFSET)	Deflection board

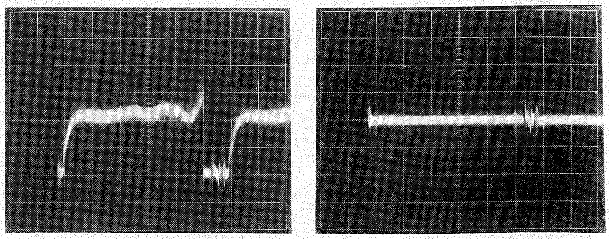
- Keep setting the AGC switch to ON position.
- Keep setting the YL ON/OFF switch to ON position.
- Cap on the lens.
- Connect the oscilloscope to TP002.
- Trigger the oscilloscope at H.rate. (Use TP005 on process board)
- Turn VR014 fully clockwise.
- Adjust VR012 and VR013 so that the top portion of bias current waveform becomes as narrow as possible. (Fig. 4-2-16)



NO GOOD GOOD

Fig. 4-2-16

- Adjust VR014 so that the center portion of bias current level matches the optical black (OB) level. (Fig. 4-2-17)



NO GOOD GOOD

Fig. 4-2-17

(15) AIC level adjustment

Test point :	TP003 (TRACKING)	Process board
Adjust :	VR004 (AIC SET)	Process board

- Keep setting the AGC switch to ON position.
- Keep setting the YL ON/OFF switch to ON position.
- Aim the camera at the logarithmic gray scale chart.
- Connect the oscilloscope to TP003.

- Trigger the oscilloscope at H.rate. (Use TP005 on process board)
- Adjust VR004 for 0.5V from the optical black to the top step of the gray scale waveform. (Fig. 4-2-18)

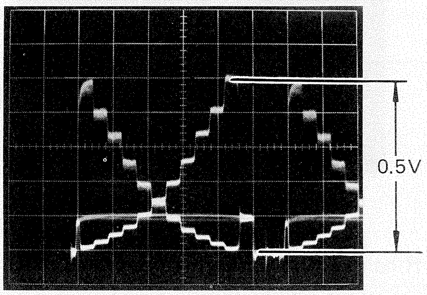


Fig. 4-2-18

(16) AGC gain adjustment

Test point :	TP013 (YL)	Process board
Adjusts :	VR001 (MAN GAIN)	Process board
	VR002 (AGC SET)	Process board

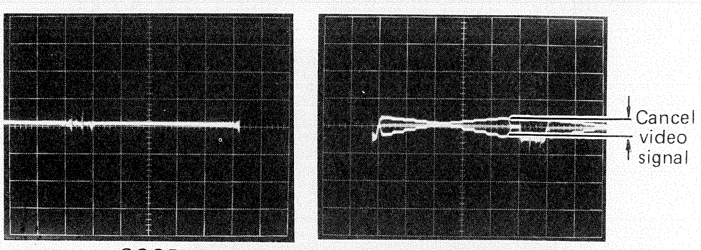
- Keep setting the YL ON/OFF switch to ON position.
- Keep setting the AGC switch to ON position.
- Aim the camera at the gray scale chart.
- Turn VR005 fully clockwise.
- Connect the oscilloscope to TP013.
- Trigger the oscilloscope at H.rate. (Use TP005 on process board)
- Adjust VR002 for 0.5V from the optical black to the top step of the gray scale waveform. (See Fig. 4-2-18)
- Change the AGC switch position to OFF.
- Adjust VR001 for 0.5V from the optical black to the top step of the gray scale waveform at TP013.
- Reset the AGC switch to ON position.

(17) Vertical edge balance adjustment

Test point :	TP008 (V EDGE)	Process board
Adjust :	VR013 (V EDGE BALANCE)	Process board

- Keep setting the AGC switch to ON position.
- Keep setting the YL ON/OFF switch to ON position.
- Aim the camera at the gray scale chart.
- Connect the oscilloscope to TP008.
- Trigger the oscilloscope at H.rate. (Use TP005 on process board)
- Adjust VR013 to cancel the video signal. (Fig. 4-2-19)

Steps denoted by shading need not be performed for pick-up tube replacement only.



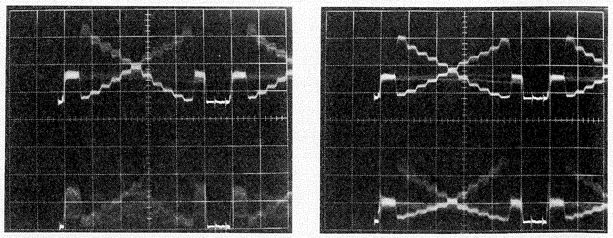
GOOD NO GOOD

Fig. 4-2-19

(18) R and B signal separation adjustment

Test points :	Pin 1 of CN007 (R)	Process board
	Pin 3 of CN007 (B)	Process board
Adjusts :	CT001 (Rc/Bc SEPARATION-1)	Process board
	VR006 (Rc/Bc SEPARATION-2)	Process board

- Keep setting the AGC switch to ON position .
- Set the YL ON/OFF switch to OFF position.
- Aim the camera at the logarithmic gray scale chart.
- Connect the oscilloscope to pins 1 and 3 of CN007.
- Trigger the oscilloscope at H.rate. (Use TP005 on process board)
- Adjust CT001 for minimum waveform flicker (especially B signal at pin 3 of CN007). (Fig. 4-2-20)
- Adjust VR006 for the same condition.
- Repeat adjusting CT001 and VR006 until the flicker in both waveform is minimum.



NO GOOD GOOD

Fig. 4-2-20

(19) Y gain adjustment

Test point :	TP009 (NTSC)	Process board
Adjust :	VR003 (Y GAIN)	Process board

- Turn VR008 full clockwise.
- Keep setting the AGC switch to ON position.
- Set the YL ON/OFF switch to ON position.
- Aim the camera at logarithmic gray scale chart.
- Connect the oscilloscope to TP009.
- Trigger the oscilloscope at H.rate. (Use TP005 on process board)

Adjust VR003 for 0.714V from the blanking level to the top step of the gray scale waveform. (Fig. 4-2-21)

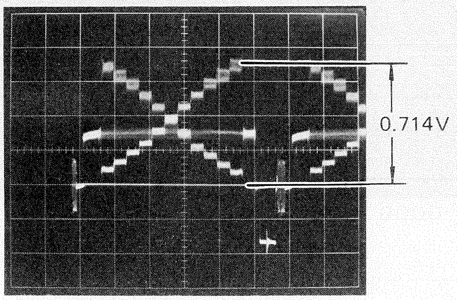


Fig. 4-2-21

(20) B gain and YL pedestal preset adjustment

Test points :	Pin 3 of CN007 (B)	Process board
	TP013 (YL)	Process board
Adjusts :	VR007 (Rc/Bc GAIN)	Process board
	VR005 (YL PED)	Process board

- Keep setting the AGC switch to ON position.
- Set the YL ON/OFF switch to OFF position.
- Aim the camera at the logarithmic gray scale chart.
- Connect the oscilloscope to TP013 and pin 3 of CN007.
- Trigger the oscilloscope at H.rate. (Use TP005 on process board)
- Set the balance adjustment control on the side of the camera to the center position.
- Turn VR011, VR012, VR014 and VR016 to their mechanical center.
- Turn VR010 and VR015 fully clockwise.
- Overlay the B signal and YL signal on the oscilloscope, and adjust VR007 so that the signal level between the black chip (zero step) and fifth step (crossing step) of the gray scale waveform match. (Fig. 4-2-22)

Note : Before adjusting VR007, if the gray scale's black chip of YL signal is suppressed, turn VR005 until the black chip of YL signal can be observed.

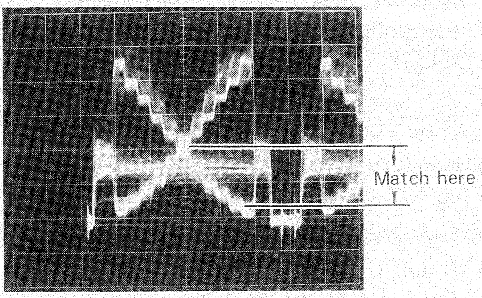


Fig. 4-2-22

- Next, adjust VR005 so that the pedestal level of YL signal matches that of B signal. (Fig. 4-2-23)

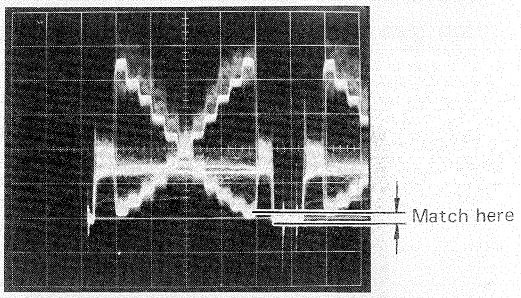


Fig. 4-2-23

(21) R gain and R pedestal preset adjustment

Test points :	Pin 1 of CN007 (R)	Process board
	TP013 (YL)	Process board
Adjusts :	VR017 (R GAIN)	Process board
	VR018 (R PED)	Process board

- Keep setting the AGC switch to ON position.
- Keep setting the YL ON/OFF switch to OFF position.
- Aim the camera at the logarithmic gray scale chart.
- Connect the oscilloscope to TP013 and pin 1 of CN007.
- Trigger the oscilloscope at H.rate. (Use TP005 on process board)
- Overlay the R signal and YL signal on the oscilloscope, and adjust VR017 so that the signal level between the black chip (zero step) and fifth step (crossing step) of the gray scale waveform match. (Fig. 4-2-24)

Note : Before adjusting VR018, if the gray scale's black chip of R signal is suppressed, turn VR018 until the black chip of R signal can be observed.

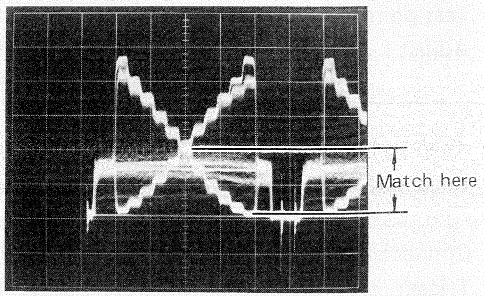


Fig. 4-2-24

- Next, adjust VR018 so that the pedestal level of R signal matches that of YL signal. (Fig. 4-2-25)

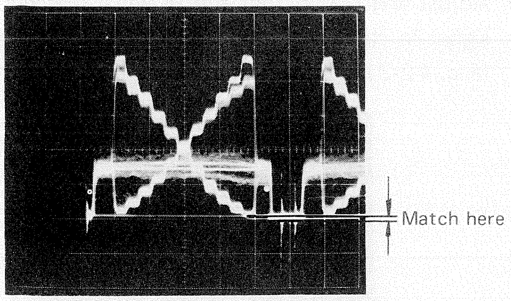


Fig. 4-2-25

- Repeat adjusting VR017 and VR018 until the signal level between the black chip (zero step) and fifth step (crossing step), and pedestal level of gray scale waveform match.

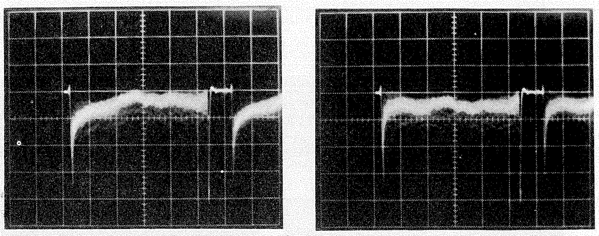
(22) Signal shading adjustment

Test points :	Pin 1 of CN007 (R)	Process board
	Pin 3 of CN007 (B)	Process board
	TP013 (YL)	Process board
Adjusts :	VR001 (R-V.PARABOLA)	Shading board
	VR002 (R-V.SAWTOOTH)	Shading board
	VR003 (R-H.PARABOLA)	Shading board
	VR004 (R-H.SAWTOOTH)	Shading board
	VR005 (B-V.PARABOLA)	Shading board
	VR006 (B-V.SAWTOOTH)	Shading board
	VR007 (B-H.PARABOLA)	Shading board
	VR008 (B-H.SAWTOOTH)	Shading board

- Keep setting the AGC switch to ON position.
- Keep setting the YL ON/OFF switch to OFF position.
- Aim the camera at the white chart.

■ R signal shading adjustment

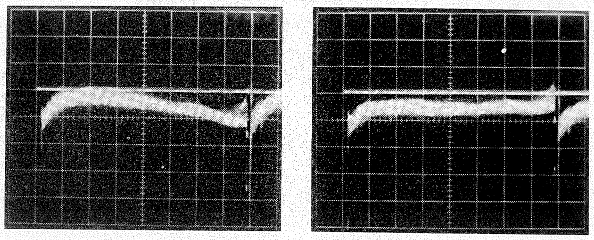
- Connect the oscilloscope to TP013 (YL) (ch1) and pin 1 of CN007 (R) (ch2).
- Trigger the oscilloscope at H.rate. (Use TP005 on process board)
- Invert ch2 (R, pin 1 of CN007) on the oscilloscope.
- Set the oscilloscope to ADD mode and observe the YL-R signal thus produced.
- Adjust VR003 and VR004 to make the waveform as flat as possible. (Fig. 4-2-26)



NO GOOD GOOD

Fig. 4-2-26

- Trigger the oscilloscope at V.rate. (Use TP006 on process board)
- Adjust VR001 and VR002 to make the waveform as flat as possible. (Fig. 4-2-27)



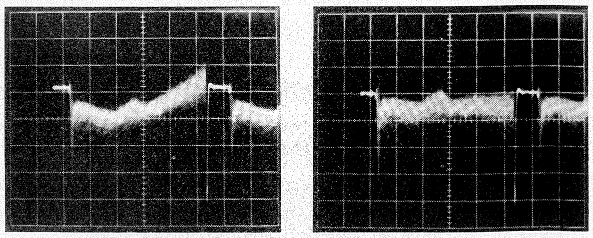
NO GOOD GOOD

Fig. 4-2-27

- Reset the Invert/Normal ch2 switch on the oscilloscope to Normal, and set to the Alternate mode.

■ B signal shading adjustment

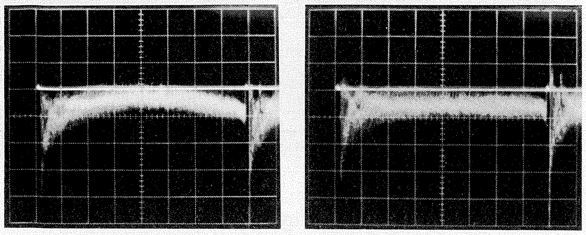
- Connect the oscilloscope to TP013 (YL) (ch1) and pin 3 of CN007 (B) (ch2).
- Trigger the oscilloscope at H.rate. (Use TP005 on process board)
- Invert ch2 (B, pin 3 of CN007) on the oscilloscope.
- Set the oscilloscope to ADD mode and observe the YL-B signal thus produced.
- Adjust VR007 and VR008 to make the waveform as flat as possible. (Fig. 4-2-28)



NO GOOD GOOD

Fig. 4-2-28

- Trigger the oscilloscope at V.rate. (Use TP006 on process board)
- Adjust VR005 and VR006 to make the waveform as flat as possible. (Fig. 4-2-29)



NO GOOD Fig. 4-2-29 GOOD

- Reset the Invert/Normal ch2 switch on the oscilloscope to Normal, and set the oscilloscope to the Alternate mode.

(23) YL and B signal tracking adjustment

Test points :	Pin 3 of CN007 (B)	Process board
	TP013 (YL)	Process board
Adjusts :	VR007 (Rc/Bc GAIN)	Process board
	VR005 (YL PED)	Process board
	VR012 (B TRACKING-1)	Process board
	VR011 (B TRACKING-2)	Process board
	VR010 (B TRACKING-3)	Process board

- Keep setting the AGC switch to ON position.
- Keep setting the YL ON/OFF switch to OFF position.
- Confirm VR10 and VR15 are turned fully counterclockwise, and VR012 and VR011 are set to their mechanical center.
- Aim the camera at the logarithmic gray scale chart.
- Connect the oscilloscope to TP013 and pin 3 of CN007.
- Trigger the oscilloscope at H.rate. (Use TP005 on process board)
- Overlay the B signal and YL signal on the oscilloscope, and confirm that the signal level between the black chip (zero step) and fifth step (crossing step) of the gray scale waveforms match. If not, adjust VR007 to match them. (Fig. 4-2-30)

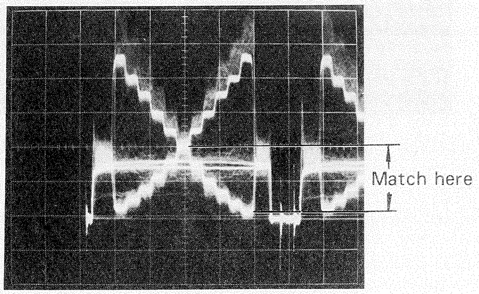


Fig. 4-2-30

- Adjust VR012 so that the B signal matches the YL signal in the lower half of the gray scale waveform. (Fig. 4-2-31)

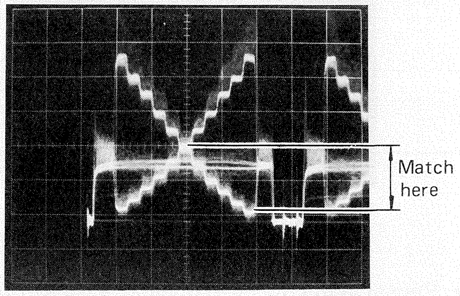


Fig. 4-2-31

- Adjust VR005 so that the pedestal level of YL signal matches that of B signal. (Fig. 4-2-32)

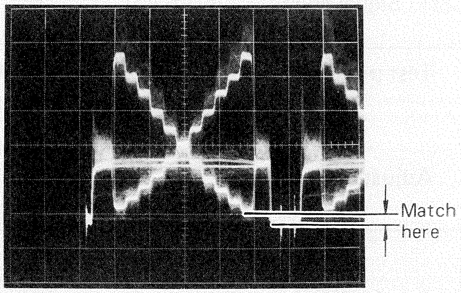


Fig.4-2-32

- Adjust VR010 and VR011 so that the B signal matches the YL signal in the 5th - 10th step of gray scale waveform. (Fig. 4-2-33)

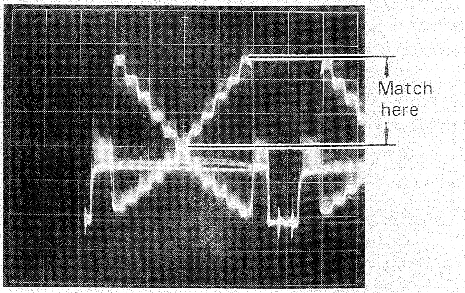


Fig. 4-2-33

- Repeat these steps until the YL and B signal waveforms match.

Steps denoted by shading need not be performed for pick-up tube replacement only.

(24) YL and R signal tracking adjustment

Test points :	Pin 1 of CN007 (R)	Process board
	TP013 (YL)	Process board
Adjusts :	VR017 (R GAIN)	Process board
	VR018 (R PED)	Process board
	VR016 (R TRACKING-1)	Process board
	VR014 (R TRACKING-2)	Process board
	VR015 (R TRACKING-3)	Process board

- Keep setting the AGC switch to ON position.
- Keep setting the YL ON/OFF switch to OFF position.
- Confirm that VR016 and VR014 are set to their mechanical center.
- Aim the camera at the logarithmic gray scale chart.
- Connect the oscilloscope to TP013 and pin 1 of CN007.
- Trigger the oscilloscope at H.rate. (Use TP005 on process board)
- Overlay the R signal and the YL signal on the oscilloscope and confirm that the signal level between the black chip (zero step) and fifth step (crossing step) of the gray scale waveforms match. If not, adjust VR017 to match them. (Fig. 4-2-34)

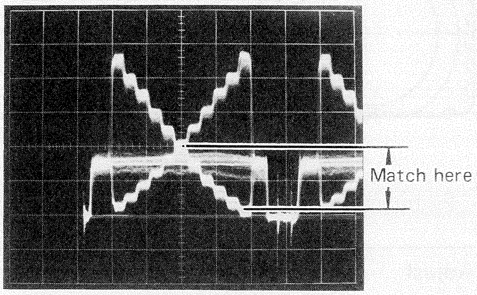


Fig. 4-2-34

- Adjust VR016 so that the R signal matches the YL signal in the lower half of the gray scale waveform. (Fig. 4-2-35)

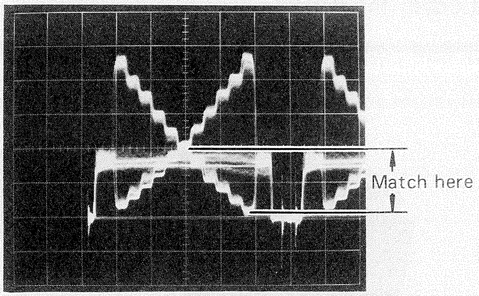


Fig. 4-2-35

- Adjust VR018 so that the pedestal level of R signal matches that of YL signal. (Fig. 4-2-36)

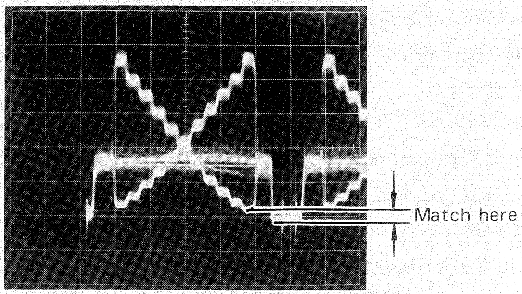


Fig. 4-2-36

- Adjust VR014 and VR015 so that the R signal matches the YL signal in the 5th - 10th step of gray scale waveform. (Fig. 4-2-37)

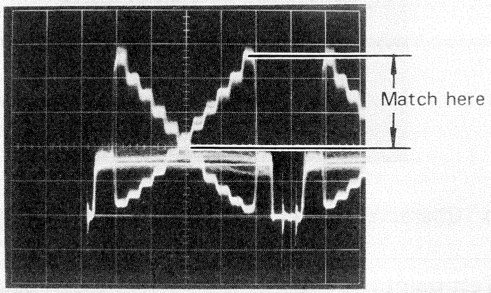


Fig. 4-2-37

- Repeat these steps until the YL and R signal waveforms match.

(25) Burst level adjustment

Test point :	TP009 (NTSC)	Process board
Adjust :	VR009 (BURST LEVEL)	Process board

- Keep setting the AGC switch to ON position.
- Reset the YL ON/OFF switch to ON position.
- Aim the camera at the logarithmic gray scale chart.
- Connect the oscilloscope to TP009.
- Trigger the oscilloscope at H.rate. (Use TP005 on process board)
- Adjust VR009 for 0.286V of burst level. (Fig. 4-2 38)

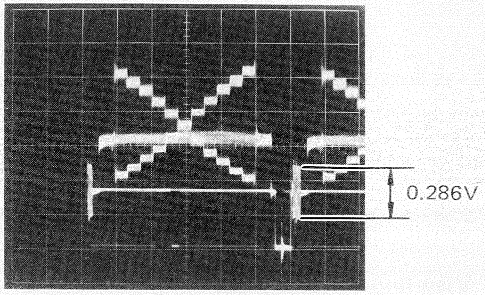


Fig. 4-2-38

(26) Chroma gain and burst phase adjustment

Adjusts :	VR008 (CHROMA GAIN)	Process board
	CT002 (BURST PHASE)	Process board
Observe :	Vectorscope	

- Keep setting the AGC switch to ON position.
- Keep setting the YL ON/OFF switch to ON position.
- Aim the camera at the color chart.
- Connect the NTSC output to a terminated vectorscope.
- Adjust VR008 so that the RED vector on the vectorscope is equal to 190% as compares to the burst signal. (Fig. 4-2-39)
- Adjust CT002 so that the RED vector is 14° away from the R-Y axis. (Fig. 4-2-39)

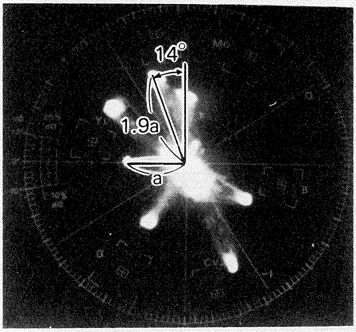


Fig. 4-2-39

(27) Character size adjustment

Test point :	TP001	Micon board
Adjust :	VR001 (CHARACTER SIZE)	Micon board

- Connect the frequency counter to TP001.
- Adjust VR001 for 5MHz when active type probe is used.
- Adjust VR001 for 4.7MHz when 12pF input capacitance type probe is used.
  Make sure that calendar and VCR playback control letters are in right position on the EVF monitor as shown in Fig. 4-2-40 when camera is operated with VCR and VCR is set at playback mode.

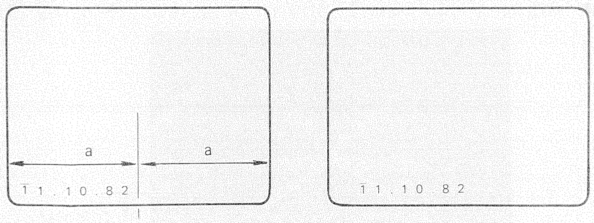


Fig. 4-2-40

4-3 Viewfinder Adjustment

- The camera must be completely aligned before viewfinder adjustment is made.
- The conditions and connections for viewfinder adjustment are the same as shown in Fig. 4-1-1 on page 8.
- Refer to page 22 for the adjusting controls and test points.

Steps denoted by shading need not be performed for pick-up tube replacement only.

(1) Horizontal hold adjustment

Test point :	TP004 (AFC)	Deflection board
Adjust :	VR009 (H HOLD)	Deflection board

- Keep setting the AGC switch to ON position.
- Keep setting the YL ON/OFF switch to ON position.
- Connect the oscilloscope to the TP004.
- Trigger the oscilloscope at V.rate. (Use TP007 on deflection board)
- Adjust VR009 for 2.6 ± 0.1V.

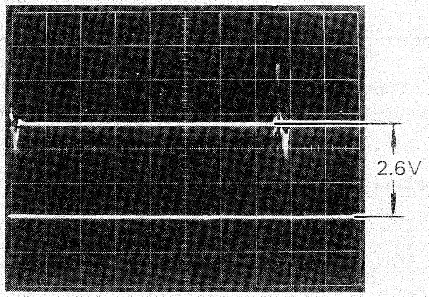


Fig. 4-3-1

(2) Reduce picture size

Reduce picture size using VR001 on the deflection circuit board and VL001 on the viewfinder circuit board.

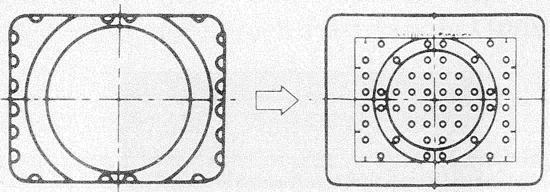


Fig. 4-3-2

(3) Picture tilt adjustment

Adjust :	Deflection Coil
Observe :	Viewfinder

- Keep setting the AGC switch to ON position.
- Keep setting the YL ON/OFF switch to ON position.
- Aim the camera at the ball chart.
- Make sure the camera is level with the chart.
- Loosen the deflection coil holding screw. (Fig.4-3-3)

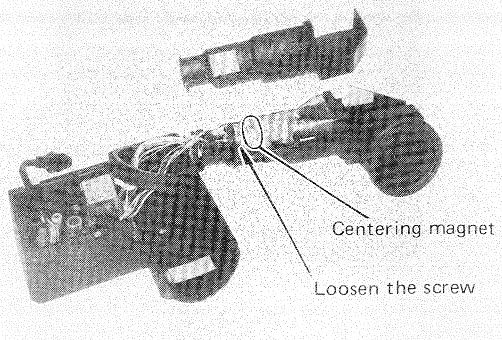


Fig. 4-3-3

- Observe the viewfinder, and turn the deflection coil until the image is straight.
- Tighten the deflection coil holding screw.

(4) Centering magnets adjustment

Adjust :	Centering magnets
Observe :	Viewfinder

- Keep setting the AGC switch to ON position.
- Keep setting the YL ON/OFF switch to ON position.
- Aim the camera at the ball chart.
- Adjust the centering magnets (see Fig. 4-3-3) until the center of picture (raster) comes to the center of the viewfinder screen. (Fig. 4-3-4)

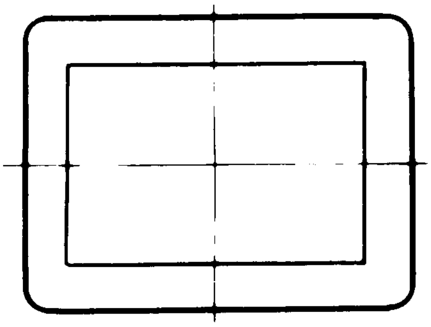


Fig. 4-3-4

(5) EVF V.SIZE adjustment

Adjust :	VR008	
	(EVF V SIZE)	Deflection board
	VL001 (H SIZE)	Viewfinder
Observe :	Viewfinder	

- Aim the camera at the ball chart, and line up the reference arrow head with edge of the raster (blanking) on the viewfinder. (Fig. 4-3-5)
- Keep setting the AGC switch to ON position.
- Keep setting the YL ON/OFF switch to ON position.
- Adjust VL001 to a point where the ball chart's edges just disappear on the viewfinder. (Fig. 4-3-5)
- Then adjust VR008 so that the circle in the chart is nearly a true circle.

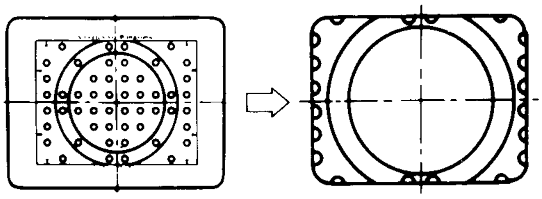


Fig. 4-3-5

Steps denoted by shading need not be performed for pick-up tube replacement only.

(6) Focus adjustment

Adjust :	VR001 (FOCUS)	Viewfinder board
Observe :	Viewfinder	

- Keep setting the AGC switch to ON position.
- Keep setting the YL ON/OFF switch to ON position.
- Adjust VR001 for best resolution in the viewfinder.

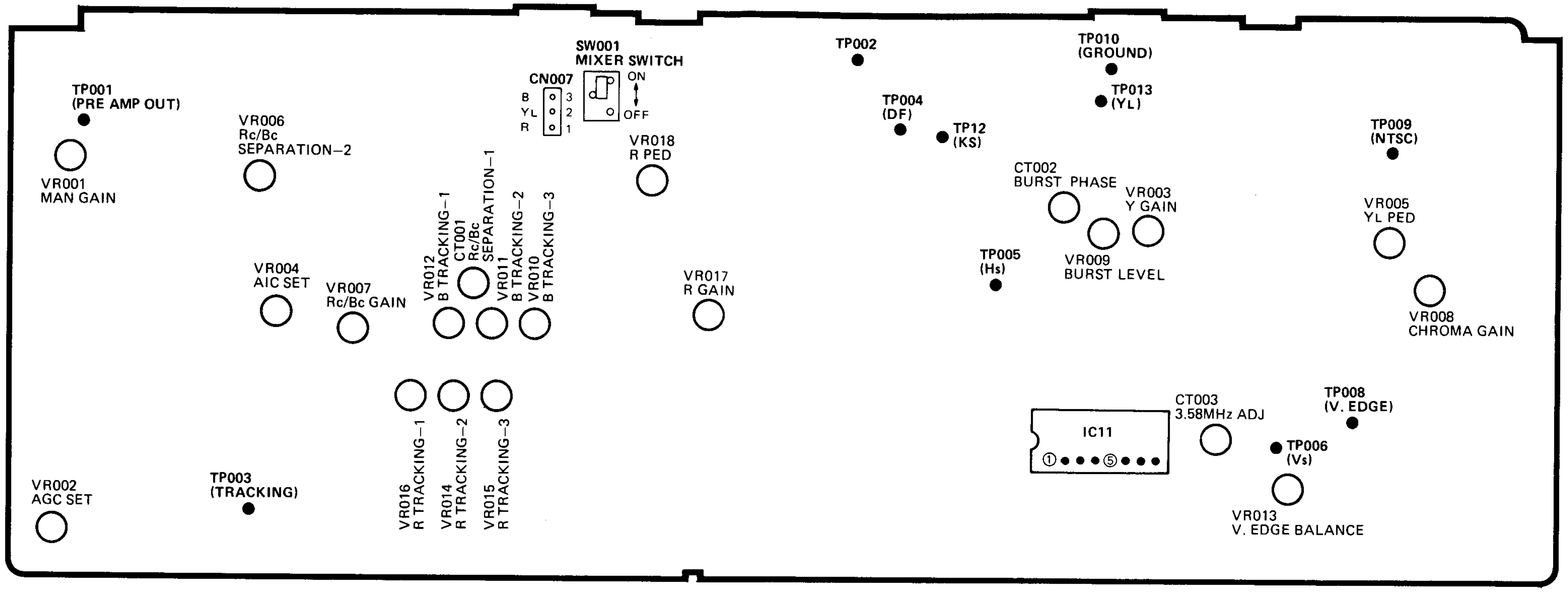
(7) Contrast and brightness adjustment

Adjusts :	VR002 (CONTRAST)	Viewfinder board
	VR003 (BRIGHT)	Viewfinder board
Observe :	Viewfinder	

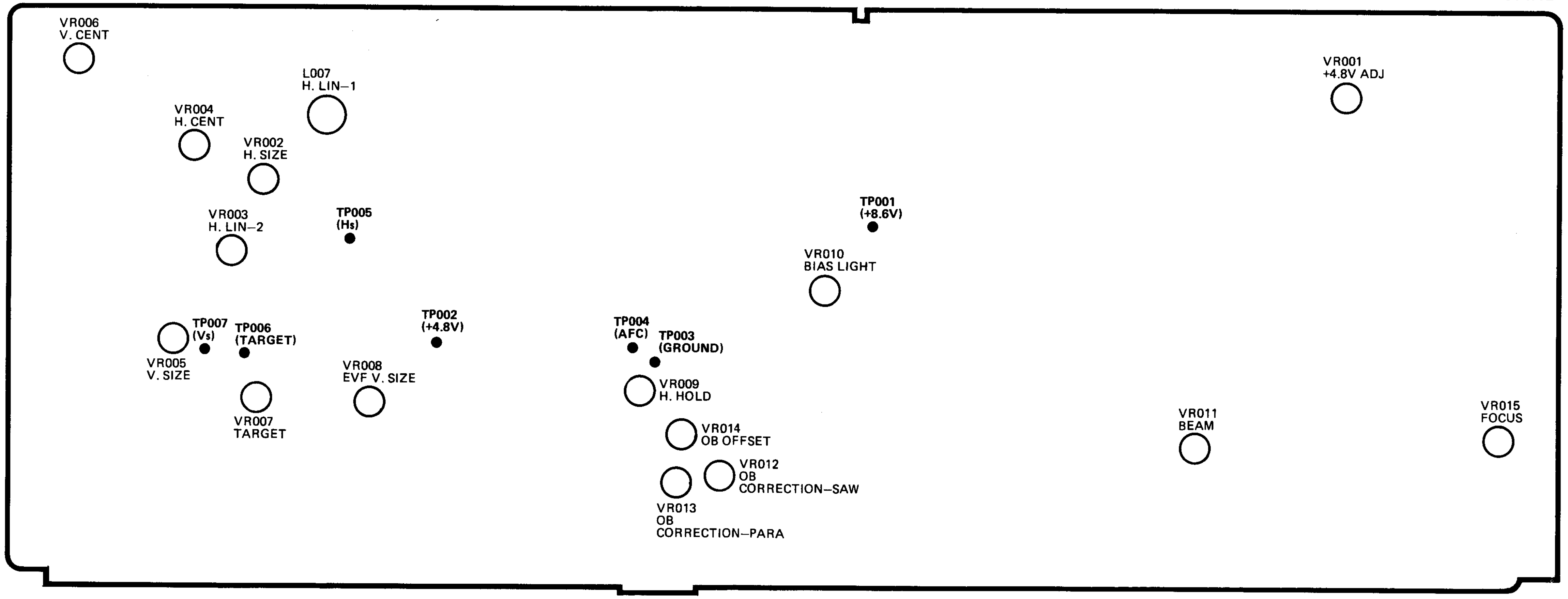
- Keep setting the AGC switch to ON position.
- Keep setting the YL ON/OFF switch to ON position.
- Aim the camera at the logarithmic gray scale chart.
- Adjust VR002 and VR003 so that the black-and-white chip gradations will be the same on the viewfinder screen as that in the monitor.

LOCATION OF TEST POINTS AND ADJUSTING CONTROLS

PROCESS CIRCUIT BOARD

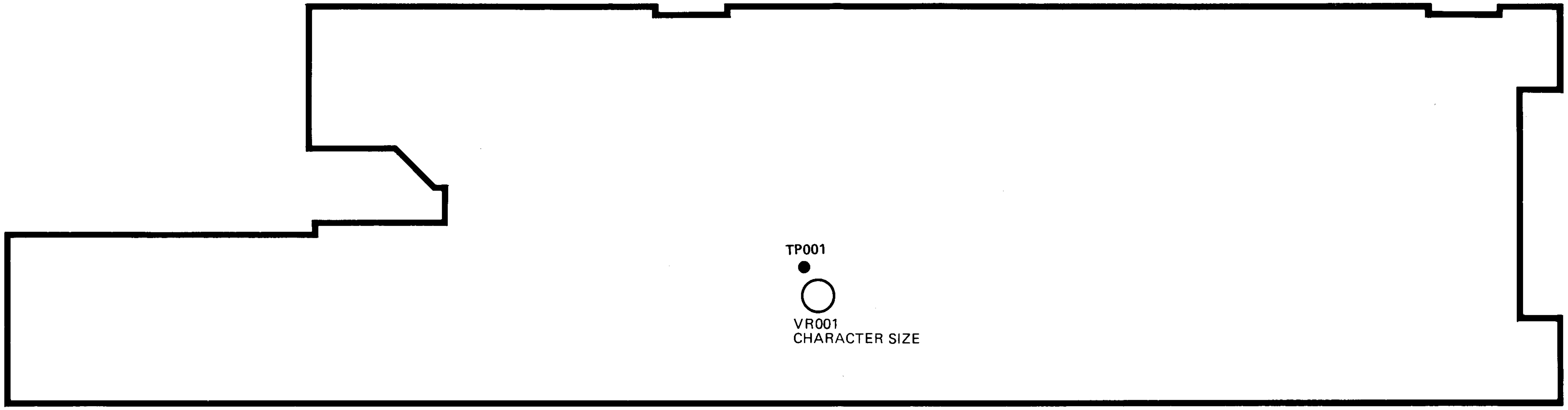

TP001
(PRE AMP OUT)
VR001
MAN GAIN
VR006
Rc/Bc
SEPARATION−2
SW001
MIXER SWITCH
CN007
B
YL
R
3
2
1
ON
OFF
VR018
R PED
TP002
TP004
(DF)
TP12
(KS)
TP010
(GROUND)
TP013
(YL)
TP009
(NTSC)
CT002
BURST PHASE
VR003
Y GAIN
VR009
BURST LEVEL
VR005
YL PED
VR008
CHROMA GAIN
VR004
AIC SET
VR007
Rc/Bc GAIN
VR012
B TRACKING−1
CT001
Rc/Bc
SEPARATION−1
VR011
B TRACKING−2
VR010
B TRACKING−3
VR017
R GAIN
TP005
(Hs)
VR002
AGC SET
TP003
(TRACKING)
VR016
R TRACKING−1
VR014
R TRACKING−2
VR015
R TRACKING−3
IC11
①●●●⑤●●●
CT003
3.58MHz ADJ
TP008
(V. EDGE)
TP006
(Vs)
VR013
V. EDGE BALANCE

DEFLECTION CIRCUIT BOARD

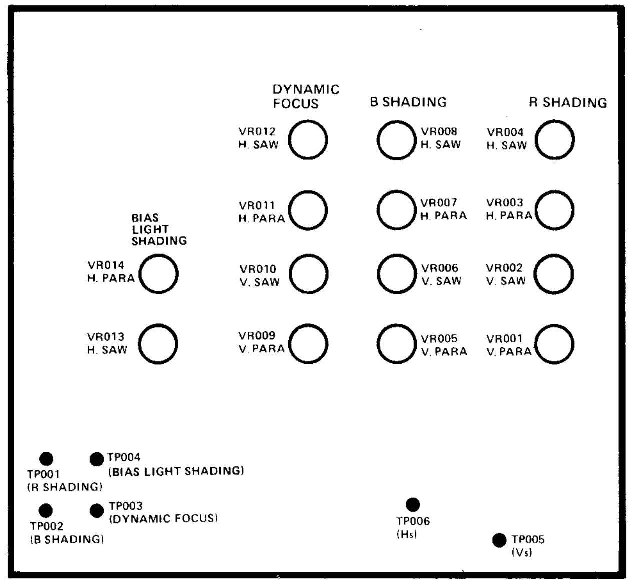

VR006
V. CENT
L007
H. LIN−1
VR004
H. CENT
VR002
H. SIZE
VR003
H. LIN−2
TP005
(Hs)
VR001
+4.8V ADJ
TP001
(+8.6V)
VR010
BIAS LIGHT
TP007
(Vs)
VR005
V. SIZE
TP006
(TARGET)
VR007
TARGET
VR008
EVF V. SIZE
TP002
(+4.8V)
TP004
(AFC)
TP003
(GROUND)
VR009
H. HOLD
VR014
OB OFFSET
VR012
OB
CORRECTION−SAW
VR013
OB
CORRECTION−PARA
VR011
BEAM
VR015
FOCUS

LOCATION OF TEST POINTS AND ADJUSTING CONTROLS

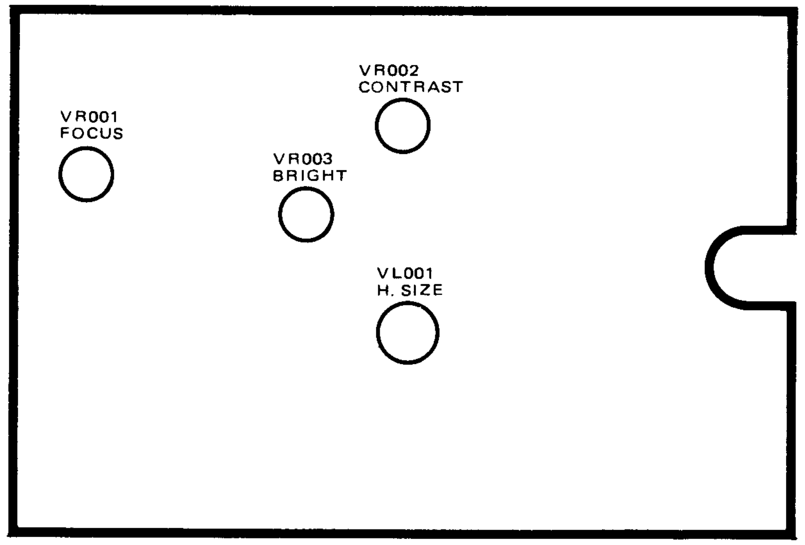
MICRO PROCESSOR CIRCUIT BOARD


TP001
VR001
CHARACTER SIZE

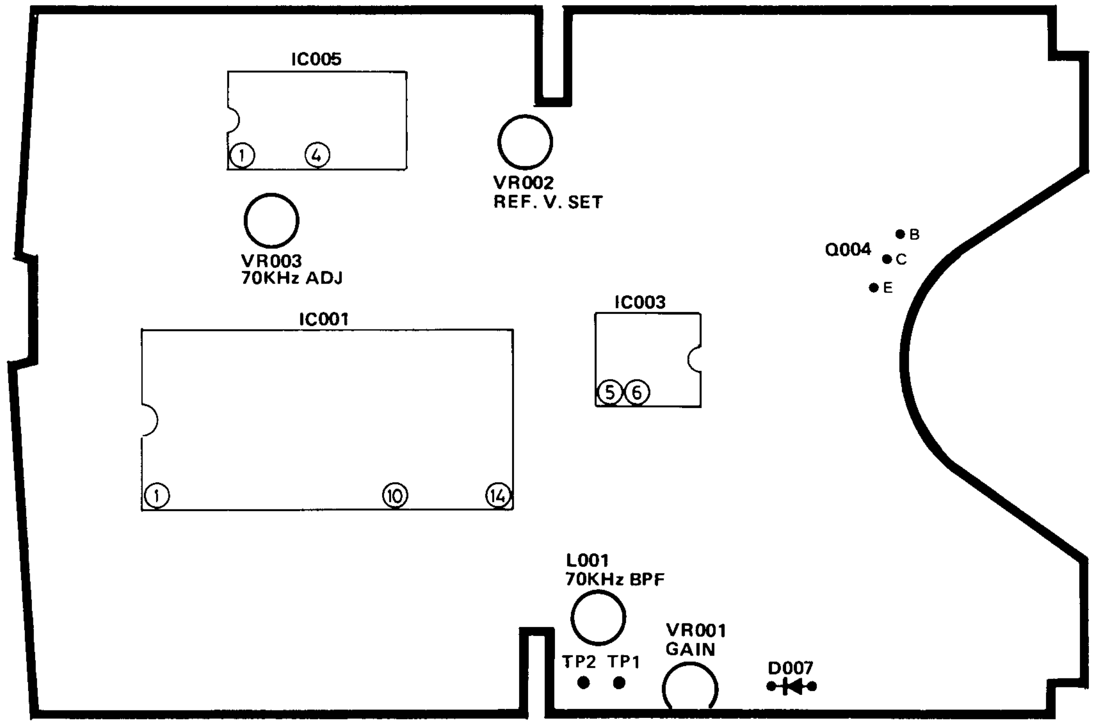
SHADING CORRECTION CIRCUIT BOARD


DYNAMIC FOCUS
B SHADING
R SHADING
VR012 H. SAW
VR008 H. SAW
VR004 H. SAW
BIAS LIGHT SHADING
VR011 H. PARA
VR007 H. PARA
VR003 H. PARA
VR014 H. PARA
VR010 V. SAW
VR006 V. SAW
VR002 V. SAW
VR013 H. SAW
VR009 V. PARA
VR005 V. PARA
VR001 V. PARA
TP001 (R SHADING)
TP004 (BIAS LIGHT SHADING)
TP002 (B SHADING)
TP003 (DYNAMIC FOCUS)
TP006 (Hs)
TP005 (Vs)

EVF CIRCUIT BOARD


VR001
FOCUS
VR002
CONTRAST
VR003
BRIGHT
VL001
H. SIZE

AUTO FOCUS CIRCUIT BOARD


IC005
①
④
VR002
REF. V. SET
VR003
70KHz ADJ
Q004
B
C
E
IC003
⑤⑥
IC001
①
⑩
⑭
L001
70KHz BPF
VR001
GAIN
TP2 TP1
D007

4-4 Auto Focus Lens Adjustment

- Disassemble the lens as described in Section 2. "DISASSEMBLY PROCEDURE FOR ADJUSTMENT" on page 1.
- Connect the two lens connectors to the connectors on the front portion of the camera.
- Adjust the auto focus lens using with completely adjusted camera.
- Refer to page 22 for the adjusting controls and test points.

(1) 70KHz adjustment

Test point :	Pin 4 of IC005
Adjust :	VR003 (70KHz ADJ)

- Connect the jumper wire between pin 10 and pin 14 of IC001.
- Connect the jumper wire between base and emitter of Q004.
- Connect the frequency counter to the pin 4 of IC005.
- Adjust VR003 for 70KHz ± 350Hz.

(2) 70KHz BPF adjustment

Test point :	TP1
Adjust :	L001 (70KHz BPF)

- Unsolder the shield plate on the auto focus circuit board.
- Connect the jumper wire between base and emitter of Q004.
- Connect the RC oscillator to cathode of D007.
- Set the RC oscillator frequency to 70KHz and set the output level of RC oscillator at 2.1V or less.
- Connect the oscilloscope to TP1.
- Set the oscilloscope at the AC mode.
- Adjust L001 for maximum output.

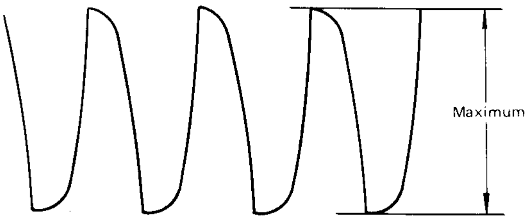


Fig. 4-4-1

(3) REF.V. set adjustment

Test point :	Pin 6 of IC003
Adjust :	VR002 (REF.V.SET)

- Connect the oscilloscope to pin 6 of IC003.
- Adjust VR002 so that output voltage becomes 100mV after 23 msec (at 68°F) from trigger point. Select the timing (msec) which is shown at the vertical graduation through the temperature graduation and crosspoint in Fig. 4-4-3.

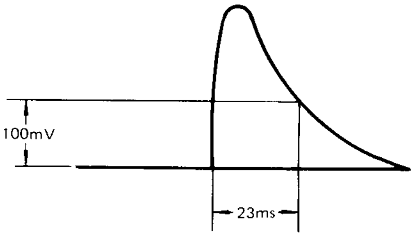


Fig. 4-4-2

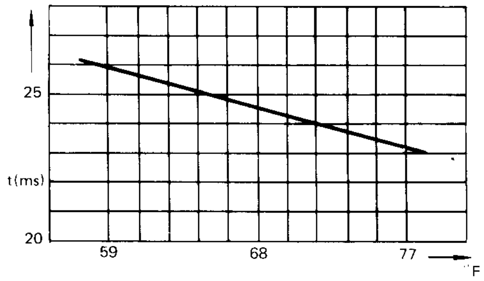


Fig. 4-4-3

(4) Focus ring position sensor adjustment

- Loosen the four focus ring position sensor holding screws.
- Aim the camera at the ball chart.
- Set the distance between camera and chart to 3m.
- Set SW001 (AUTO ON/OFF) switch to OFF position.
- Adjust the focus ring position sensor so that input level of pin 7 of IC001 becomes "L" level and input level of pins 2, 3, 4, 5, and 6 of IC001 become "H" level.

(5) Gain adjustment

Test point :	TP1
Adjust :	VR001 (GAIN)

- Set the distance between the object and camera to 2m.
- Set SW001 (AUTO ON/OFF) switch to ON position.
- Adjust VR001 so that picture on the monitor becomes best focus.
- Connect the oscilloscope to TP1 and confirm that the voltage is approx. 4.4V.

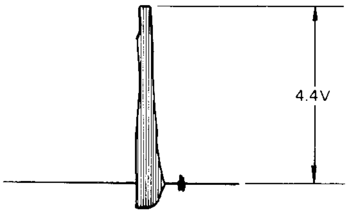


Fig. 4-4-4

5 MICRO PROCESSOR BOARD REMOVAL

- Disassemble the camera as described in Section 2 "DISASSEMBLY PROCEDURE FOR ADJUSTMENT on page 1.
- Remove the four screws holding the rear cover and remove the rear panel (Fig. 5-1).

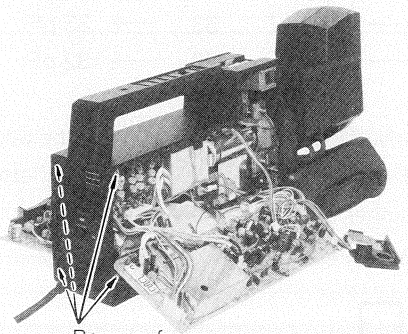
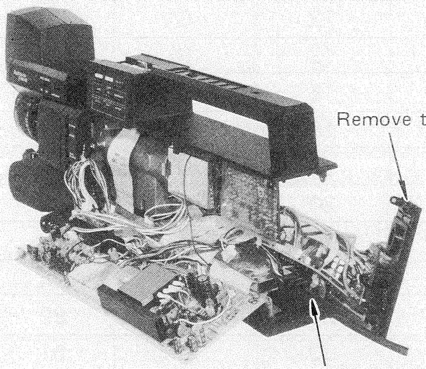

Remove four screws

Fig. 5-1

- Disconnect CN001, CN002, CN003, CN004, CN005, CN006 and CN008 on the deflection board.
- Disconnect CN001, CN002 and CN003 on the micro processor board.
- Also disconnect CN001, CN002 and CN005 on the process board.
- Remove the camera cable from the ditch of bottom cover. (Fig. 5-2)


Remove the rear panel

Remove the camera cable

Fig. 5-2

- Remove the two screws holding the pick-up tube shield cases (Fig. 5-3) and remove the pick-up tube shield cases.

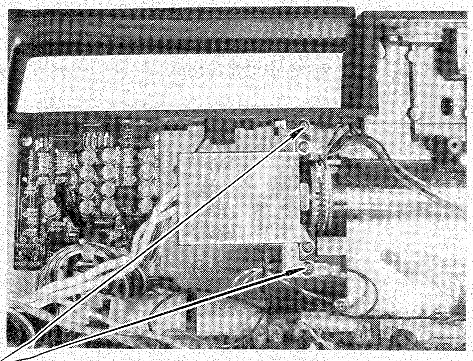

Remove two screws

Fig. 5-3

- Remove the one screw holding the earth lug of C001 (0.068μF 1600V) and remove the pick-up tube socket. (Fig. 5-4)

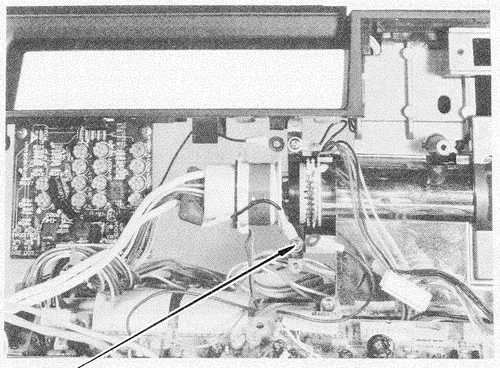

Remove one screw

Fig. 5-4

- Unlock the plastic-lock of the bottom cover located under the process board and loosen the micro processor board as shown in Fig. 5-5

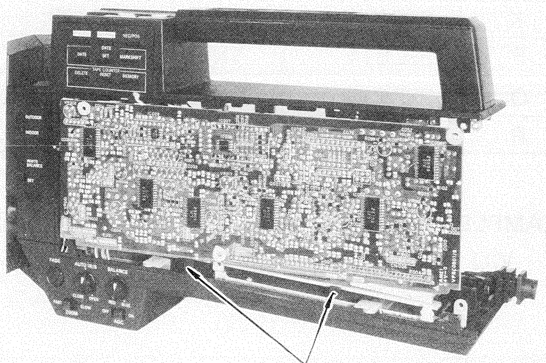

Unlock two plastic-locks

Fig. 5-5

- Pull out carefully the micro processor board, deflection board and process board to backward of the camera. (Fig. 5-6)

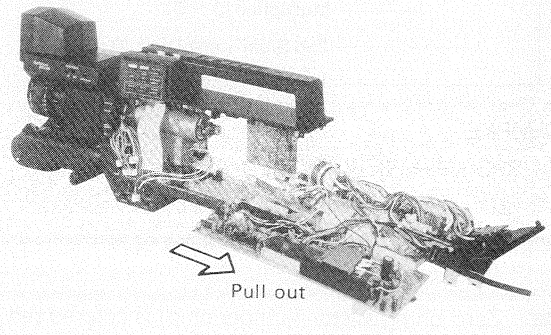
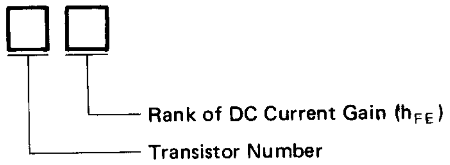

Pull out

Fig. 5-6

INDICATION ON CHIP COMPONENTS

1. Chip Transistor

The transistor number is indicated on the top surface of the chip transistor using two alphabet letters.



Transistor Number

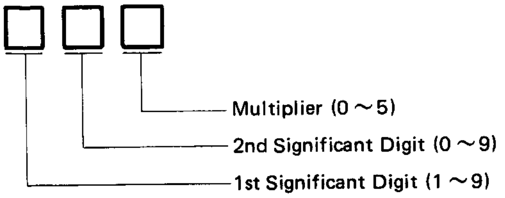
Letter	Transistor No.	Letter	Transistor No.
A	2SB709	S	2SC2405
B	2SB709A	T	2SC2406
C	2SB710	U	2SC2404
D	2SB710A	V	2SC2295
E	2SA1022	W	2SD602
F	2SA1034	X	2SD602A
H	2SA1035	Y	2SD601
I	2SB792	Z	2SD601A
K	2SC2778	1Z	2SD1030
P	2SD814	1N	2SK199
Q	2SD813	1O	2SK198
R	2SC2480		

EXAMPLE:

WQ → 2SD602 – Q
YQ → 2SD601 – Q

2. Chip Resistor

The resistor value is indicated on the bottom surface of the chip resistor using three digit numbers.



EXAMPLE:

330 → 33×10^0 = 33 ohms
561 → 56×10^1 = 560 ohms
123 → 12×10^3 = 12 kohms

Note: Zero ohm resistor (jumper chip) is colored red or green.

3. Chip Capacitor

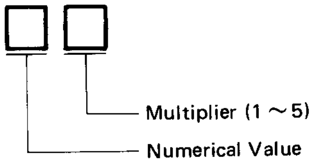
The capacitive value of ***replacement*** chip capacitors is indicated on the bottom surface. Original parts do not have value indication.

If the capacitive value is less than 100 pF, the value will be indicated by one or two digit number expressing the capacity directly in pF.

EXAMPLE:

0.5 → 0.5 pF 2.5 → 2.5 pF
.75 → 0.75 pF 33 → 33 pF
1 → 1 pF 82 → 82 pF

If the capacitive value is 100 pF or greater, the value will be indicated by an alpha-numeric code. The letter precedes the number and expresses a numerical value to be multiplied by the number which follows.



Numerical Value

Letter	Value	Letter	Value
A	10	N	33
B	11	P	36
C	12	Q	39
D	13	R	43
E	15	S	47
F	16	T	51
G	18	U	56
H	20	V	62
J	22	W	68
K	24	X	75
L	27	Y	82
M	30	Z	91

* Letters I and O are not used.

EXAMPLE:

A1 → 10×10^1 = 100 pF
N2 → 33×10^2 = 3300 pF
S3 → 47×10^3 = 47000 pF

ORDER NO. VKD82070644C4

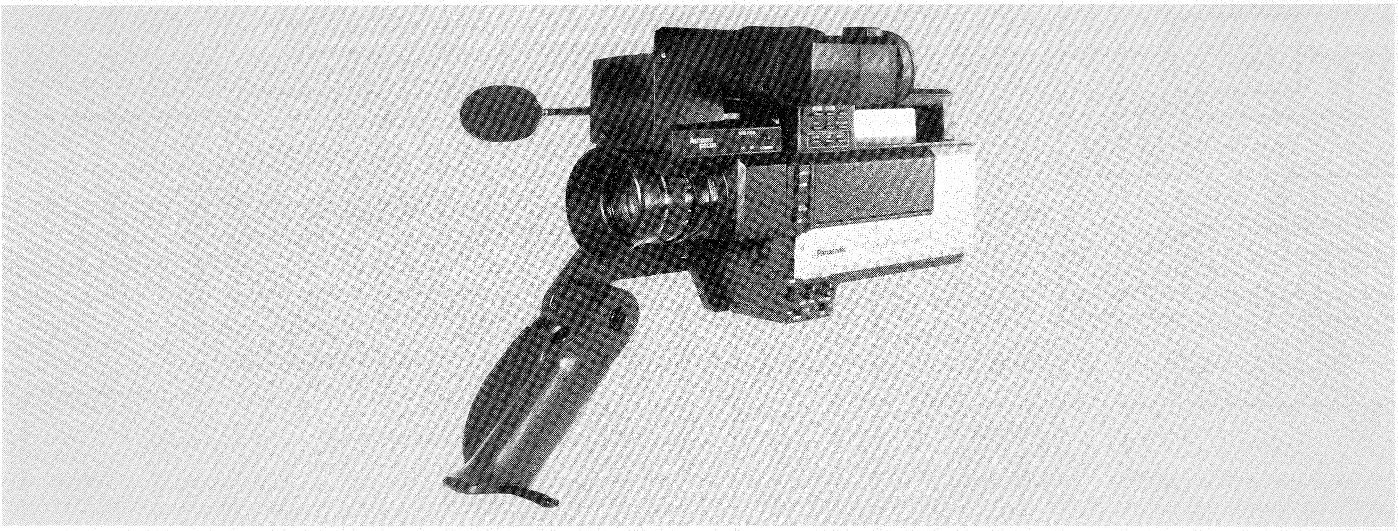
Service Manual

Vol. 3

Block Diagrams
Schematic Diagrams
Conductor Views

Color Video Camera

WV-4850



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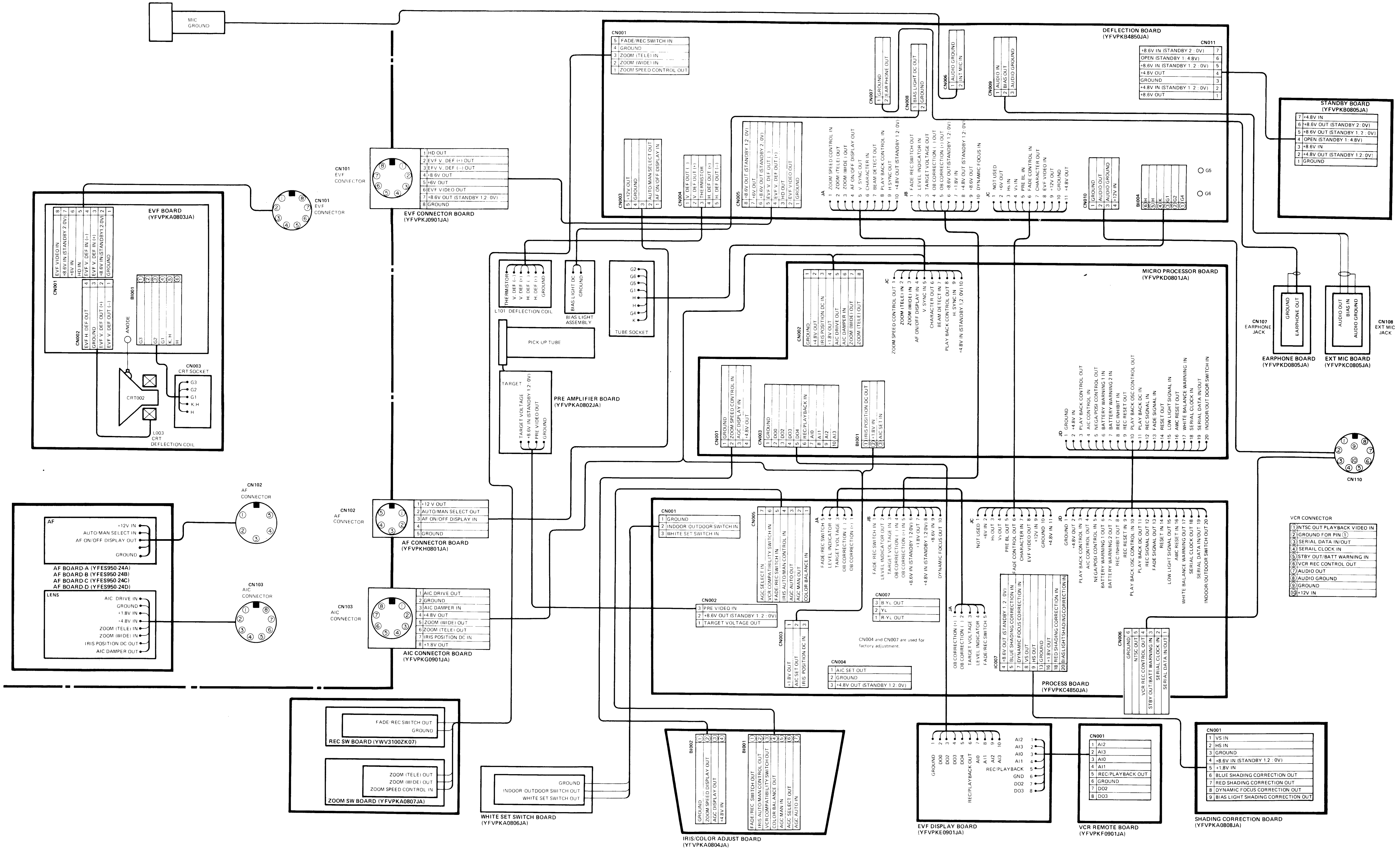
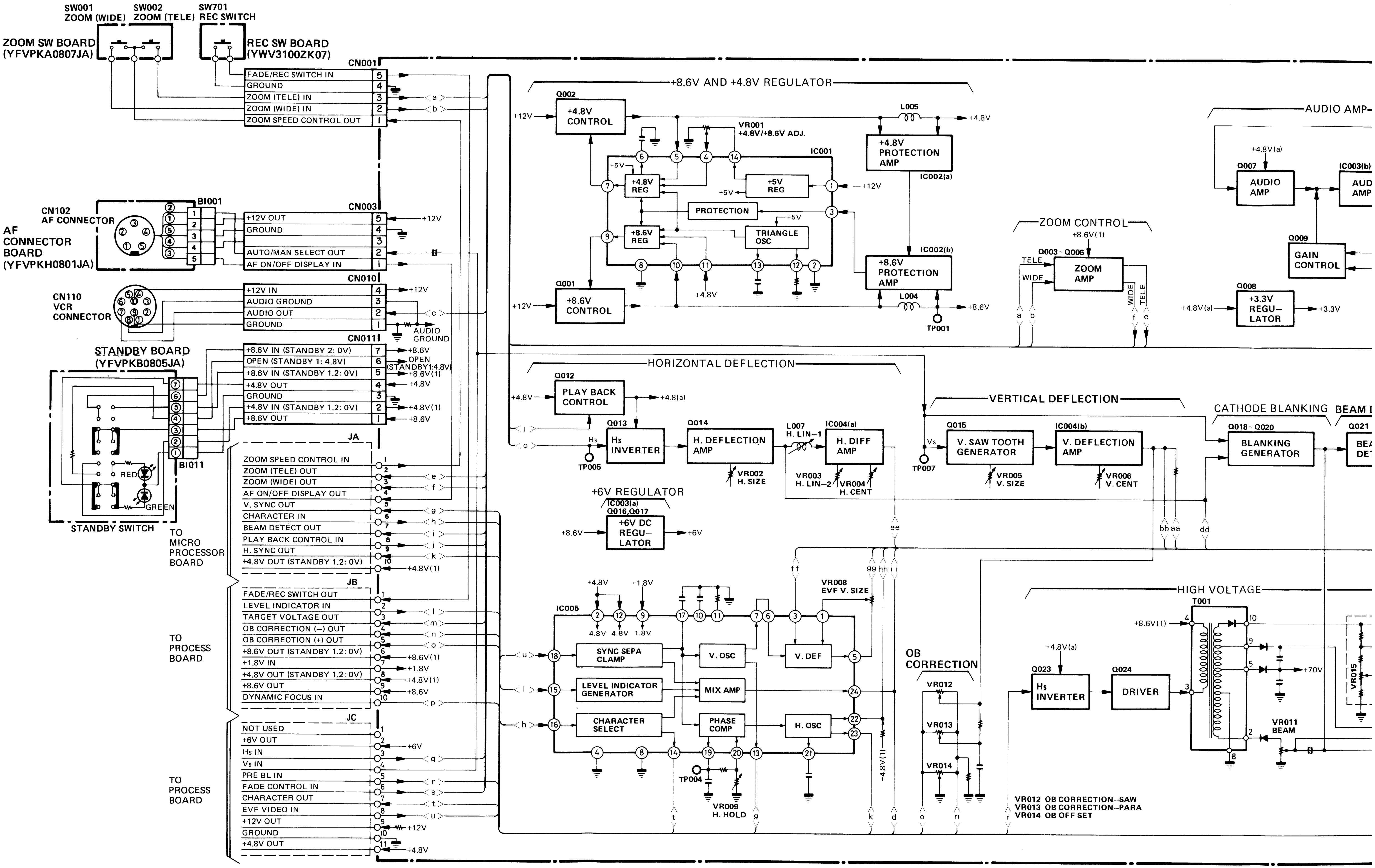
Matsushita Electric Industrial Co., Ltd.
1-2, 1-chome, Shibakoen, Minato-ku, Tokyo 105 Japan

WIRING DIAGRAM

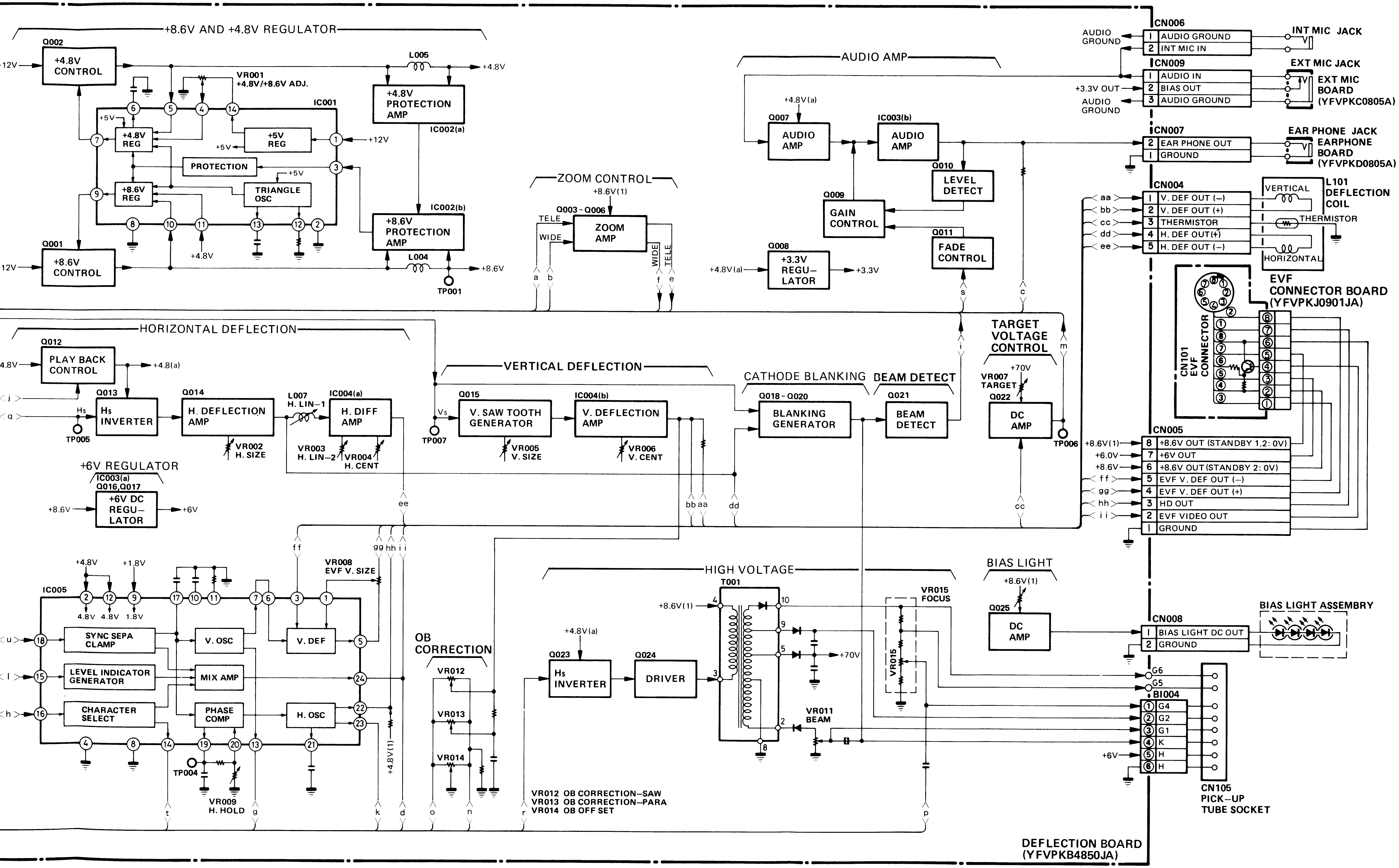

MIC GROUND
DEFLECTION BOARD (YFVPKB4850JA)
STANDBY BOARD (YFVPKB0805JA)
EVF BOARD (YFVPKA0803JA)
CN101 EVF CONNECTOR
EVF CONNECTOR BOARD (YFVPKJ0901JA)
MICRO PROCESSOR BOARD (YFVPKD0801JA)
L101 DEFLECTION COIL
BIAS LIGHT ASSEMBLY
TUBE SOCKET
PICK-UP TUBE
PRE AMPLIFIER BOARD (YFVPKA0802JA)
CN003 CRT SOCKET
CRT002
L003 CRT DEFLECTION COIL
CN107 EARPHONE JACK
CN108 EXT MIC JACK
EARPHONE BOARD (YFVPKD0805JA)
EXT MIC BOARD (YFVPKC0805JA)
CN110
CN102 AF CONNECTOR
AF CONNECTOR BOARD (YFVPKH0801JA)
AF BOARD-A (YFES950-24A)
AF BOARD-B (YFES950-24B)
AF BOARD-C (YFES950-24C)
AF BOARD-D (YFES950-24D)
LENS
CN103 AIC CONNECTOR
AIC CONNECTOR BOARD (YFVPKG0901JA)
PROCESS BOARD (YFVPKC4850JA)
CN004 and CN007 are used for factory adjustment
VCR CONNECTOR
① NTSC OUT PLAYBACK VIDEO IN
② GROUND FOR PIN ①
③ SERIAL DATA IN/OUT
④ SERIAL CLOCK IN
⑤ STBY OUT/BATT WARNING IN
⑥ VCR REC CONTROL OUT
⑦ AUDIO OUT
⑧ AUDIO GROUND
⑨ GROUND
⑩ +12V IN
REC SW BOARD (YWV3100ZK07)
ZOOM SW BOARD (YFVPKA0807JA)
WHITE SET SWITCH BOARD (YFVPKA0806JA)
IRIS/COLOR ADJUST BOARD (YFVPKA0804JA)
EVF DISPLAY BOARD (YFVPKE0901JA)
VCR REMOTE BOARD (YFVPKF0901JA)
SHADING CORRECTION BOARD (YFVPKA0808JA)

BLOCK DIAGRAM OF DEFLECTION BOARD (YFVPKA4850JA)



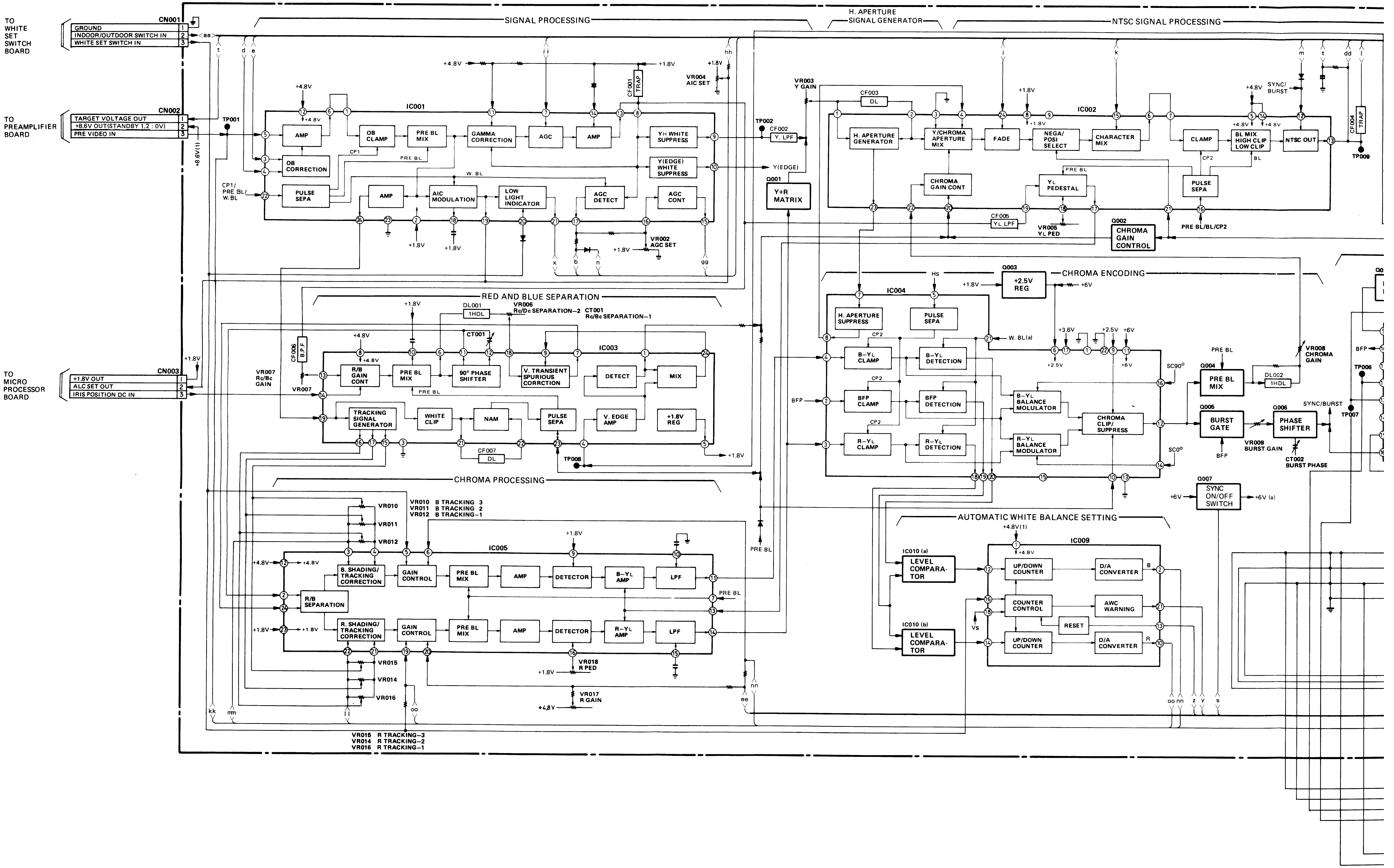
SW001 ZOOM (WIDE)
SW002 ZOOM (TELE)
SW701 REC SWITCH
ZOOM SW BOARD (YFVPKA0807JA)
REC SW BOARD (YWV3100ZK07)
CN001
FADE/REC SWITCH IN 5
GROUND 4
ZOOM (TELE) IN 3
ZOOM (WIDE) IN 2
ZOOM SPEED CONTROL OUT 1
CN102 AF CONNECTOR
AF CONNECTOR BOARD (YFVPKH0801JA)
BI001
CN003
+12V OUT 5
GROUND 4
3
AUTO/MAN SELECT OUT 2
AF ON/OFF DISPLAY IN 1
CN110 VCR CONNECTOR
CN010
+12V IN 4
AUDIO GROUND 3
AUDIO OUT 2
GROUND 1
AUDIO GROUND
STANDBY BOARD (YFVPKB0805JA)
CN011
+8.6V IN (STANDBY 2: 0V) 7
OPEN (STANDBY 1: 4.8V) 6
+8.6V IN (STANDBY 1.2: 0V) 5
+4.8V OUT 4
GROUND 3
+4.8V IN (STANDBY 1.2: 0V) 2
+8.6V OUT 1
OPEN (STANDBY1:4.8V)
+8.6V(1)
+4.8V(1)
BI011
RED
GREEN
STANDBY SWITCH
JA
ZOOM SPEED CONTROL IN 1
ZOOM (TELE) OUT 2
ZOOM (WIDE) OUT 3
AF ON/OFF DISPLAY OUT 4
V. SYNC OUT 5
CHARACTER IN 6
BEAM DETECT OUT 7
PLAY BACK CONTROL IN 8
H. SYNC OUT 9
+4.8V OUT (STANDBY 1.2: 0V) 10
TO MICRO PROCESSOR BOARD
JB
FADE/REC SWITCH OUT 1
LEVEL INDICATOR IN 2
TARGET VOLTAGE OUT 3
OB CORRECTION (−) OUT 4
OB CORRECTION (+) OUT 5
+8.6V OUT (STANDBY 1.2: 0V) 6
+1.8V IN 7
+4.8V OUT (STANDBY 1.2: 0V) 8
+8.6V OUT 9
DYNAMIC FOCUS IN 10
TO PROCESS BOARD
JC
NOT USED 1
+6V OUT 2
Hs IN 3
Vs IN 4
PRE BL IN 5
FADE CONTROL IN 6
CHARACTER OUT 7
EVF VIDEO IN 8
+12V OUT 9
GROUND 10
+4.8V OUT 11
TO PROCESS BOARD
+8.6V AND +4.8V REGULATOR
Q002 +4.8V CONTROL
Q001 +8.6V CONTROL
+12V
VR001 +4.8V/+8.6V ADJ.
IC001
+4.8V REG
+8.6V REG
+5V REG
PROTECTION
TRIANGLE OSC
L005
L004
+4.8V PROTECTION AMP IC002(a)
+8.6V PROTECTION AMP IC002(b)
TP001
+4.8V
+8.6V
ZOOM CONTROL
+8.6V(1)
Q003~Q006 ZOOM AMP
TELE
WIDE
AUDIO AMP
+4.8V(a)
Q007 AUDIO AMP
IC003(b) AUD AMP
Q009 GAIN CONTROL
Q008 +3.3V REGULATOR
+3.3V
HORIZONTAL DEFLECTION
Q012 PLAY BACK CONTROL
+4.8(a)
Q013 Hs INVERTER
TP005
Q014 H. DEFLECTION AMP
VR002 H. SIZE
L007 H. LIN−1
IC004(a) H. DIFF AMP
VR003 H. LIN−2
VR004 H. CENT
VERTICAL DEFLECTION
Q015 V. SAW TOOTH GENERATOR
TP007
VR005 V. SIZE
IC004(b) V. DEFLECTION AMP
VR006 V. CENT
CATHODE BLANKING
Q018~Q020 BLANKING GENERATOR
BEAM DET
Q021
+6V REGULATOR
IC003(a) Q016,Q017 +6V DC REGULATOR
+6V
IC005
SYNC SEPA CLAMP
LEVEL INDICATOR GENERATOR
CHARACTER SELECT
V. OSC
MIX AMP
PHASE COMP
V. DEF
H. OSC
VR008 EVF V. SIZE
TP004
VR009 H. HOLD
OB CORRECTION
VR012
VR013
VR014
HIGH VOLTAGE
T001
Q023 Hs INVERTER
Q024 DRIVER
+70V
VR011 BEAM
VR015
VR012 OB CORRECTION−SAW
VR013 OB CORRECTION−PARA
VR014 OB OFF SET

BLOCK DIAGRAM OF DEFLECTION BOARD (YFVPKA4850JA)

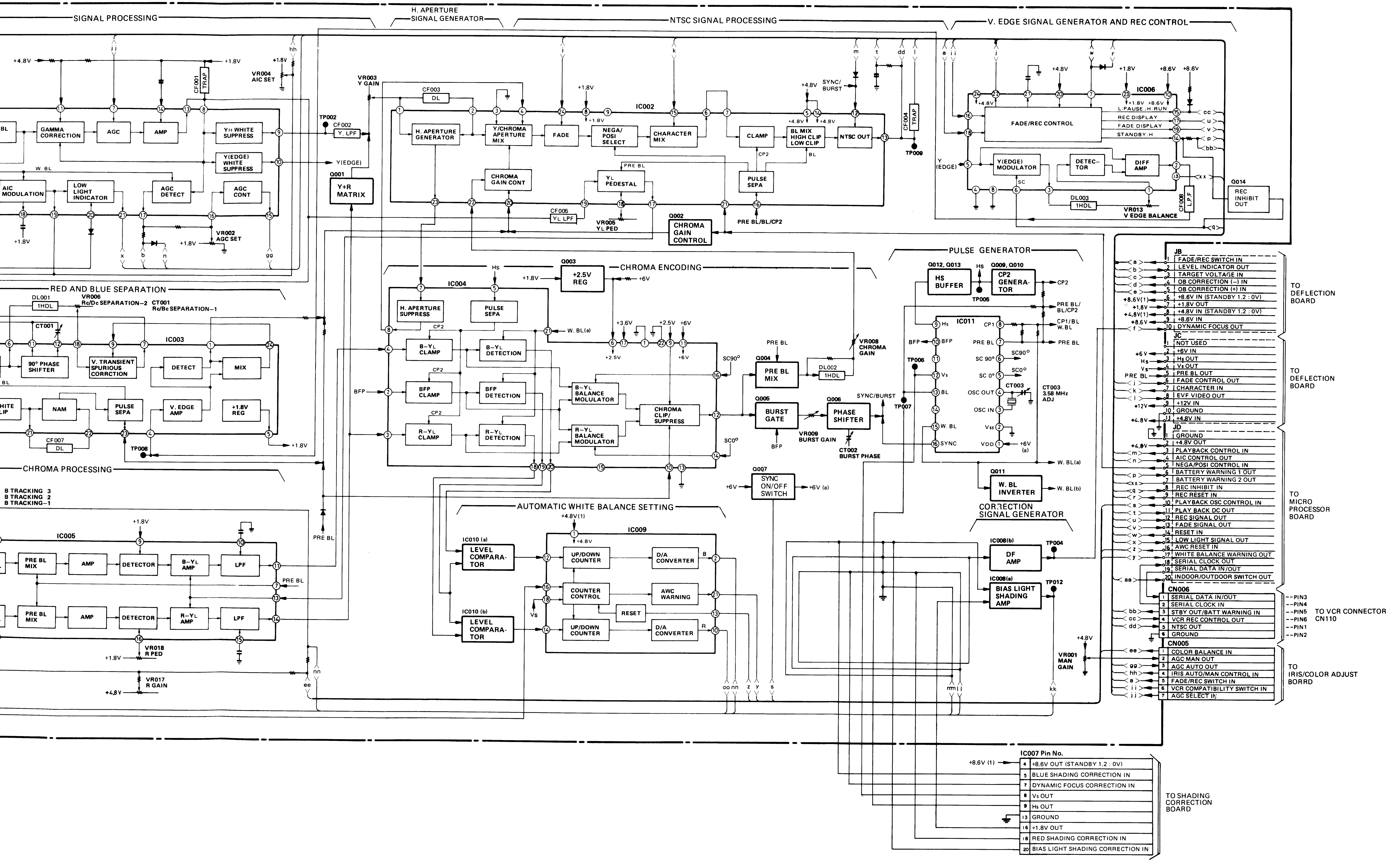


+8.6V AND +4.8V REGULATOR
Q002
+4.8V CONTROL
12V
L005
+4.8V
VR001
+4.8V/+8.6V ADJ.
IC001
+4.8V PROTECTION AMP
IC002(a)
+5V
+4.8V REG
+5V REG
+12V
PROTECTION
+8.6V REG
TRIANGLE OSC
IC002(b)
+8.6V PROTECTION AMP
L004
Q001
+8.6V CONTROL
+4.8V
+8.6V
TP001
ZOOM CONTROL
+8.6V(1)
Q003~Q006
TELE
WIDE
ZOOM AMP
AUDIO AMP
+4.8V(a)
Q007
AUDIO AMP
IC003(b)
AUDIO AMP
Q010
LEVEL DETECT
Q009
GAIN CONTROL
Q011
FADE CONTROL
Q008
+3.3V REGU-LATOR
+3.3V
AUDIO GROUND
CN006
AUDIO GROUND
INT MIC IN
INT MIC JACK
CN009
AUDIO IN
BIAS OUT
AUDIO GROUND
+3.3V OUT
EXT MIC JACK
EXT MIC BOARD (YFVPKC0805A)
CN007
EAR PHONE OUT
GROUND
EAR PHONE JACK
EARPHONE BOARD (YFVPKD0805A)
CN004
V. DEF OUT (−)
V. DEF OUT (+)
THERMISTOR
H. DEF OUT(+)
H. DEF OUT (−)
VERTICAL
L101 DEFLECTION COIL
THERMISTOR
HORIZONTAL
EVF CONNECTOR BOARD (YFVPKJ0901JA)
CN101 EVF CONNECTOR
HORIZONTAL DEFLECTION
Q012
PLAY BACK CONTROL
+4.8(a)
Q013
Hs INVERTER
TP005
Q014
H. DEFLECTION AMP
VR002 H. SIZE
L007 H. LIN−1
IC004(a)
H. DIFF AMP
VR003 H. LIN−2
VR004 H. CENT
VERTICAL DEFLECTION
Q015
Vs
V. SAW TOOTH GENERATOR
TP007
VR005 V. SIZE
IC004(b)
V. DEFLECTION AMP
VR006 V. CENT
CATHODE BLANKING
Q018~Q020
BLANKING GENERATOR
BEAM DETECT
Q021
BEAM DETECT
TARGET VOLTAGE CONTROL
+70V
VR007 TARGET
Q022
DC AMP
TP006
CN005
+8.6V OUT (STANDBY 1.2: 0V)
+6V OUT
+8.6V OUT(STANDBY 2: 0V)
EVF V. DEF OUT (−)
EVF V. DEF OUT (+)
HD OUT
EVF VIDEO OUT
GROUND
+8.6V(1)
+6.0V
+8.6V
+6V REGULATOR
IC003(a)
Q016,Q017
+6V DC REGU-LATOR
+6V
IC005
+4.8V
+1.8V
4.8V 4.8V 1.8V
VR008 EVF V. SIZE
SYNC SEPA CLAMP
V. OSC
V. DEF
LEVEL INDICATOR GENERATOR
MIX AMP
CHARACTER SELECT
PHASE COMP
H. OSC
TP004
VR009 H. HOLD
+4.8V(1)
OB CORRECTION
VR012
VR013
VR014
HIGH VOLTAGE
T001
+8.6V(1)
+70V
+4.8V(a)
Q023
Hs INVERTER
Q024
DRIVER
VR011 BEAM
VR015 FOCUS
VR012 OB CORRECTION−SAW
VR013 OB CORRECTION−PARA
VR014 OB OFF SET
BIAS LIGHT
+8.6V(1)
Q025
DC AMP
CN008
BIAS LIGHT DC OUT
GROUND
BIAS LIGHT ASSEMBRY
G6
G5
BI004
G4
G2
G1
K
H
H
+6V
CN105 PICK−UP TUBE SOCKET
DEFLECTION BOARD (YFVPKB4850JA)

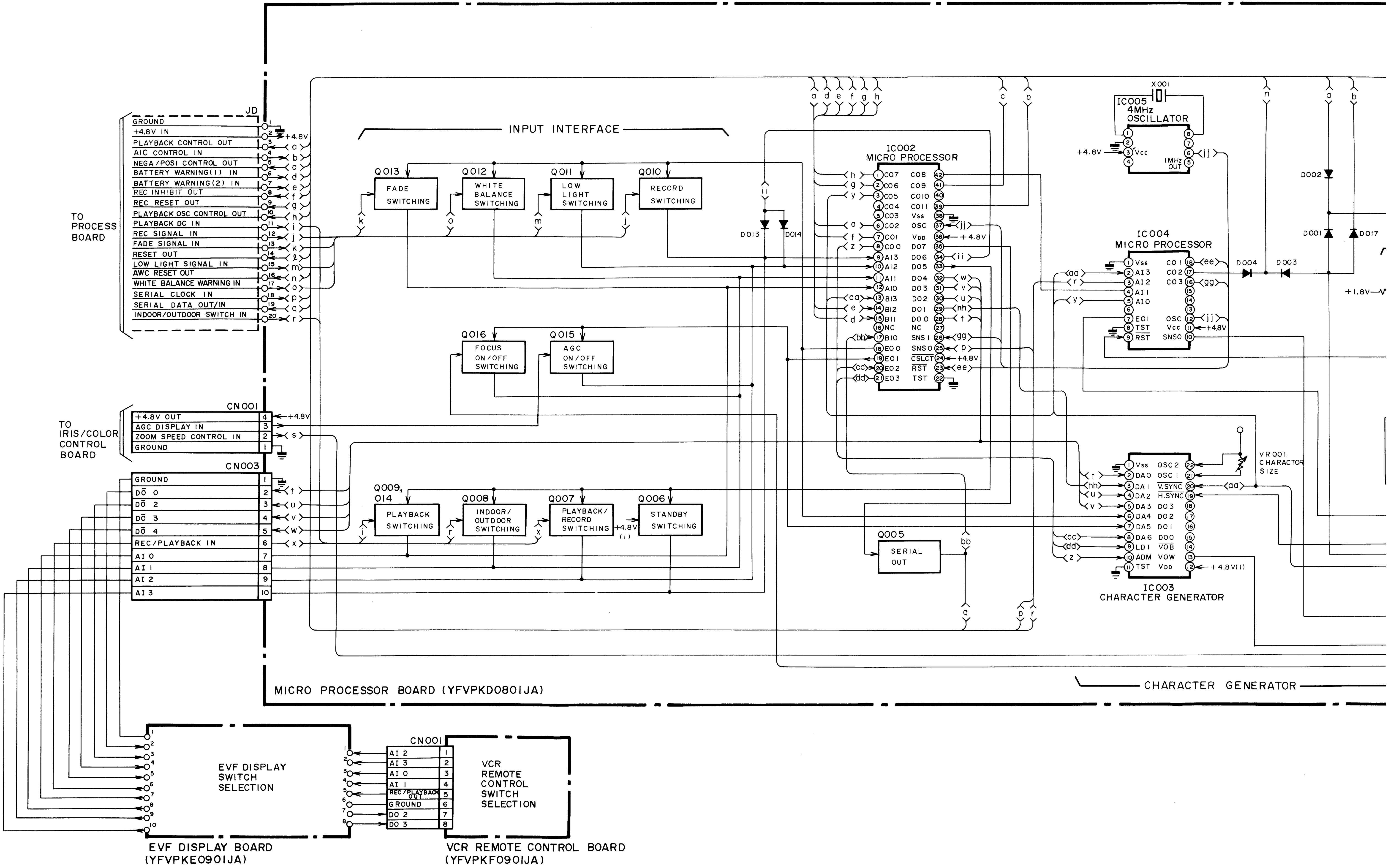
BLOCK DIAGRAM OF PROCESS BOARD (YFVPKB4850JA)


TO WHITE SET SWITCH BOARD
CN001
GROUND
INDOOR/OUTDOOR SWITCH IN
WHITE SET SWITCH IN
TO PREAMPLIFIER BOARD
CN002
TARGET VOLTAGE OUT
+8.6V OUT(STANDBY 1.2 : 0V)
PRE VIDEO IN
TO MICRO PROCESSOR BOARD
CN003
+1.8V OUT
ALC SET OUT
IRIS POSITION DC IN
TP001
+8.6V(1)
SIGNAL PROCESSING
IC001
AMP
OB CLAMP
PRE BL MIX
GAMMA CORRECTION
AGC
AMP
YH WHITE SUPPRESS
OB CORRECTION
Y(EDGE) WHITE SUPPRESS
PULSE SEPA
AMP
AIC MODULATION
LOW LIGHT INDICATOR
AGC DETECT
AGC CONT
CP1/PRE BL/W. BL
CP1
PRE BL
W. BL
CF001 TRAP
VR004 AIC SET
VR002 AGC SET
+4.8V
+1.8V
H. APERTURE SIGNAL GENERATOR
TP002
CF002 Y. LPF
VR003 Y GAIN
Y(EDGE)
Q001
Y+R MATRIX
NTSC SIGNAL PROCESSING
IC002
CF003 DL
H. APERTURE GENERATOR
Y/CHROMA APERTURE MIX
FADE
NEGA/POSI SELECT
CHARACTER MIX
CLAMP
BL MIX HIGH CLIP LOW CLIP
NTSC OUT
CHROMA GAIN CONT
YL PEDESTAL
PULSE SEPA
CF006 YL LPF
VR005 YL PED
Q002
CHROMA GAIN CONTROL
PRE BL/BL/CP2
CF004 TRAP
TP009
SYNC/BURST
RED AND BLUE SEPARATION
IC003
DL001 1HDL
VR006 RC/DC SEPARATION-2
CT001 RC/BC SEPARATION-1
CF006 B.P.F
VR007 RC/BC GAIN
R/B GAIN CONT
PRE BL MIX
90° PHASE SHIFTER
V. TRANSIENT SPURIOUS CORRCTION
DETECT
MIX
TRACKING SIGNAL GENERATOR
WHITE CLIP
NAM
PULSE SEPA
V. EDGE AMP
+1.8V REG
CF007 DL
TP008
CHROMA PROCESSING
VR010 B TRACKING 3
VR011 B TRACKING 2
VR012 B TRACKING-1
IC005
B. SHADING/TRACKING CORRECTION
GAIN CONTROL
PRE BL MIX
AMP
DETECTOR
B-YL AMP
LPF
R/B SEPARATION
R. SHADING/TRACKING CORRECTION
R-YL AMP
VR015
VR014
VR016
VR018 R PED
VR017 R GAIN
VR015 R TRACKING-3
VR014 R TRACKING-2
VR016 R TRACKING-1
PRE BL
CHROMA ENCODING
Q003
+2.5V REG
IC004
H. APERTURE SUPPRESS
PULSE SEPA
W. BL(a)
B-YL CLAMP
B-YL DETECTION
BFP CLAMP
BFP DETECTION
R-YL CLAMP
R-YL DETECTION
B-YL BALANCE MOLULATOR
R-YL BALANCE MODULATOR
CHROMA CLIP/SUPPRESS
SC90°
SC0°
BFP
VR008 CHROMA GAIN
Q004
PRE BL MIX
DL002 1HDL
Q005
BURST GATE
Q006
PHASE SHIFTER
VR009 BURST GAIN
CT002 BURST PHASE
TP006
TP007
Q007
SYNC ON/OFF SWITCH
+6V
+6V (a)
AUTOMATIC WHITE BALANCE SETTING
IC009
IC010 (a)
LEVEL COMPARA-TOR
IC010 (b)
LEVEL COMPARA-TOR
UP/DOWN COUNTER
D/A CONVERTER
COUNTER CONTROL
AWC WARNING
RESET
UP/DOWN COUNTER
D/A CONVERTER
Vs
+4.8V(1)

BLOCK DIAGRAM OF PROCESS BOARD (YFVPKB4850JA)

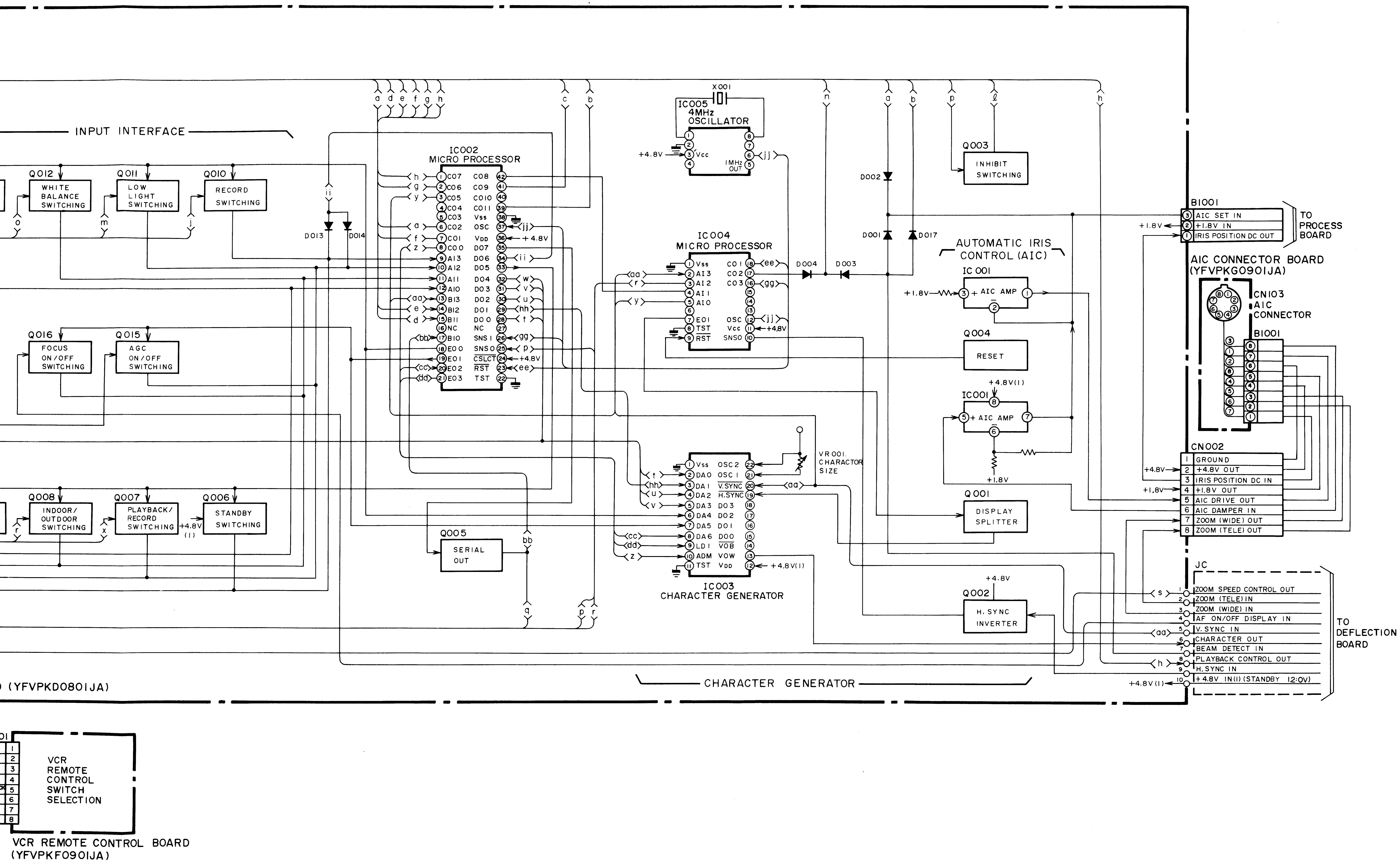

SIGNAL PROCESSING
H. APERTURE SIGNAL GENERATOR
NTSC SIGNAL PROCESSING
V. EDGE SIGNAL GENERATOR AND REC CONTROL
GAMMA CORRECTION
AGC
AMP
CF001 TRAP
VR004 AIC SET
YH WHITE SUPPRESS
Y(EDGE) WHITE SUPPRESS
AIC MODULATION
LOW LIGHT INDICATOR
AGC DETECT
AGC CONT
VR002 AGC SET
VR003 Y GAIN
TP002
CF002 Y. LPF
Y(EDGE)
Q001 Y+R MATRIX
CF003 DL
H. APERTURE GENERATOR
Y/CHROMA APERTURE MIX
CHROMA GAIN CONT
FADE
NEGA/POSI SELECT
IC002
CHARACTER MIX
YL PEDESTAL
CF006 YL LPF
VR005 YL PED
CLAMP
BL MIX HIGH CLIP LOW CLIP
NTSC OUT
SYNC/BURST
CF004 TRAP
TP009
PULSE SEPA
PRE BL/BL/CP2
Q002 CHROMA GAIN CONTROL
IC006
FADE/REC CONTROL
L:PAUSE H:RUN
REC DISPLAY
FADE DISPLAY
STANDBY:H
Y(EDGE) MODULATOR
DETECTOR
DIFF AMP
DL003 1HDL
VR013 V EDGE BALANCE
CF008 L.P.F
Q014 REC INHIBIT OUT
RED AND BLUE SEPARATION
DL001 1HDL
VR006 Rc/Dc SEPARATION-2
CT001 Rc/Bc SEPARATION-1
IC003
90° PHASE SHIFTER
V. TRANSIENT SPURIOUS CORRCTION
DETECT
MIX
NAM
PULSE SEPA
V. EDGE AMP
+1.8V REG
CF007 DL
TP008
CHROMA PROCESSING
B TRACKING 3
B TRACKING 2
B TRACKING-1
IC005
PRE BL MIX
AMP
DETECTOR
B-YL AMP
R-YL AMP
LPF
VR018 R PED
VR017 R GAIN
Q003 +2.5V REG
CHROMA ENCODING
IC004
H. APERTURE SUPPRESS
PULSE SEPA
B-YL CLAMP
B-YL DETECTION
BFP CLAMP
BFP DETECTION
R-YL CLAMP
R-YL DETECTION
B-YL BALANCE MOLULATOR
R-YL BALANCE MODULATOR
CHROMA CLIP/SUPPRESS
Q004 PRE BL MIX
DL002 1HDL
VR008 CHROMA GAIN
Q005 BURST GATE
VR009 BURST GAIN
Q006 PHASE SHIFTER
CT002 BURST PHASE
Q007 SYNC ON/OFF SWITCH
AUTOMATIC WHITE BALANCE SETTING
IC009
IC010 (a) LEVEL COMPARA-TOR
IC010 (b) LEVEL COMPARA-TOR
UP/DOWN COUNTER
D/A CONVERTER
COUNTER CONTROL
AWC WARNING
RESET
PULSE GENERATOR
Q012, Q013 HS BUFFER
TP005
Q009, Q010 CP2 GENERA-TOR
IC011
TP006
TP007
CT003 3.58 MHz ADJ
Q011 W. BL INVERTER
CORRECTION SIGNAL GENERATOR
IC008(b) DF AMP
TP004
IC008(a) BIAS LIGHT SHADING AMP
TP012
VR001 MAN GAIN
JB
1 FADE/REC SWITCH IN
2 LEVEL INDICATOR OUT
3 TARGET VOLTAGE IN
4 OB CORRECTION (–) IN
5 OB CORRECTION (+) IN
6 +8.6V IN (STANDBY 1.2 : 0V)
7 +1.8V OUT
8 +4.8V IN (STANDBY 1.2 : 0V)
9 +8.6V IN
10 DYNAMIC FOCUS OUT
TO DEFLECTION BOARD
JC
1 NOT USED
2 +6V IN
3 Hs OUT
4 Vs OUT
5 PRE BL OUT
6 FADE CONTROL OUT
7 CHARACTER IN
8 EVF VIDEO OUT
9 +12V IN
10 GROUND
11 +4.8V IN
TO DEFLECTION BOARD
JD
1 GROUND
2 +4.8V OUT
3 PLAYBACK CONTROL IN
4 AIC CONTROL OUT
5 NEGA/POSI CONTROL IN
6 BATTERY WARNING 1 OUT
7 BATTERY WARNING 2 OUT
8 REC INHIBIT IN
9 REC RESET IN
10 PLAYBACK OSC CONTROL IN
11 PLAY BACK DC OUT
12 REC SIGNAL OUT
13 FADE SIGNAL OUT
14 RESET IN
15 LOW LIGHT SIGNAL OUT
16 AWC RESET IN
17 WHITE BALANCE WARNING OUT
18 SERIAL CLOCK OUT
19 SERIAL DATA IN/OUT
20 INDOOR/OUTDOOR SWITCH OUT
TO MICRO PROCESSOR BOARD
CN006
1 SERIAL DATA IN/OUT --PIN3
2 SERIAL CLOCK IN --PIN4
3 STBY OUT/BATT WARNING IN --PIN5
4 VCR REC CONTROL OUT --PIN6
5 NTSC OUT --PIN1
6 GROUND --PIN2
TO VCR CONNECTOR CN110
CN005
1 COLOR BALANCE IN
2 AGC MAN OUT
3 AGC AUTO OUT
4 IRIS AUTO/MAN CONTROL IN
5 FADE/REC SWITCH IN
6 VCR COMPATIBILITY SWITCH IN
7 AGC SELECT IN
TO IRIS/COLOR ADJUST BORRD
IC007 Pin No.
+8.6V (1)
4 +8.6V OUT (STANDBY 1.2 : 0V)
5 BLUE SHADING CORRECTION IN
7 DYNAMIC FOCUS CORRECTION IN
8 Vs OUT
9 Hs OUT
13 GROUND
16 +1.8V OUT
18 RED SHADING CORRECTION IN
20 BIAS LIGHT SHADING CORRECTION IN
TO SHADING CORRECTION BOARD

BLOCK DIAGRAM OF MICRO PROCESSOR BOARD (YFVPKC0801JA)

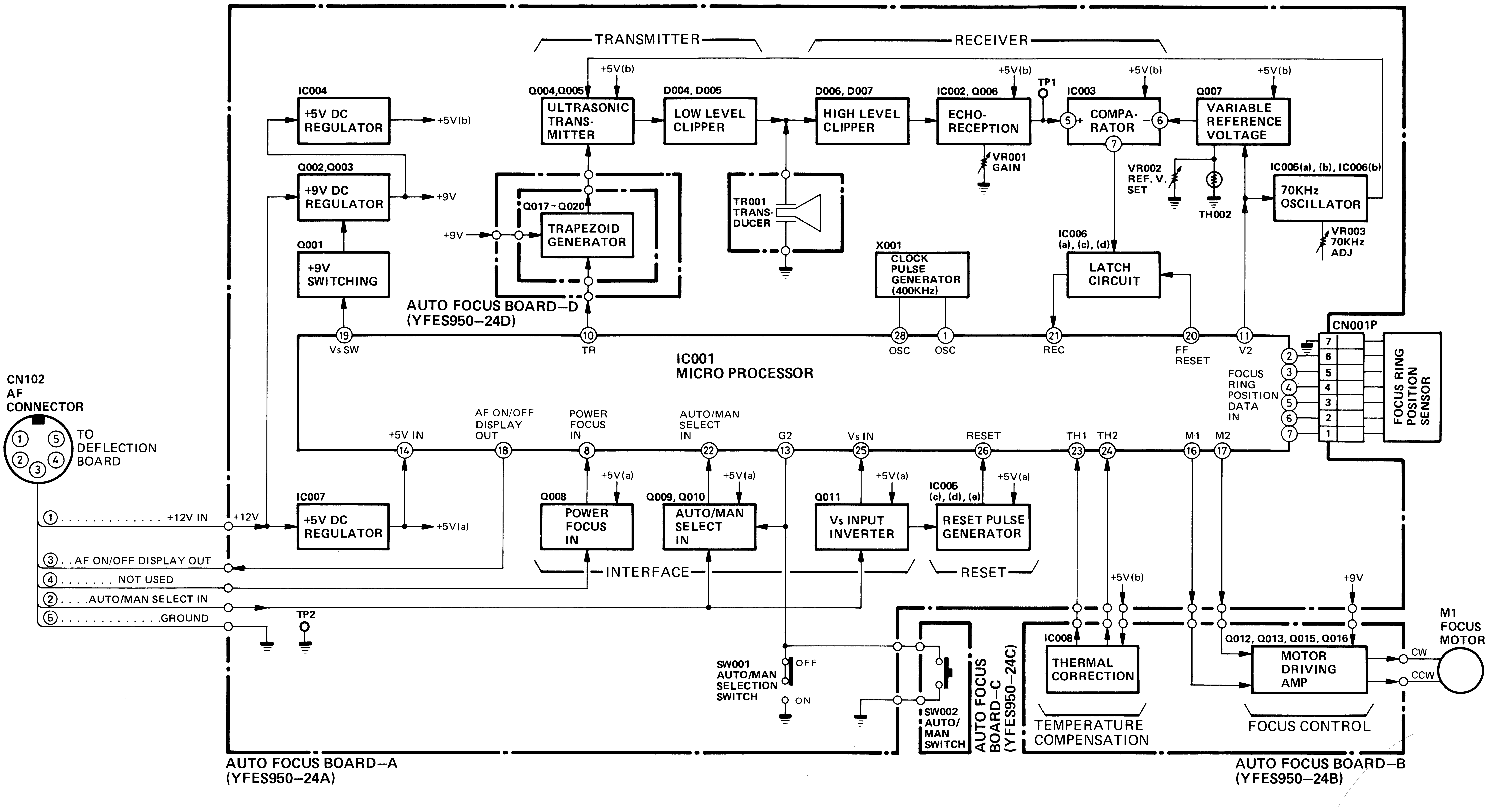


TO PROCESS BOARD
JD
GROUND
+4.8V IN
PLAYBACK CONTROL OUT
AIC CONTROL IN
NEGA/POSI CONTROL OUT
BATTERY WARNING(1) IN
BATTERY WARNING(2) IN
REC INHIBIT OUT
REC RESET OUT
PLAYBACK OSC CONTROL OUT
PLAYBACK DC IN
REC SIGNAL IN
FADE SIGNAL IN
RESET OUT
LOW LIGHT SIGNAL IN
AWC RESET OUT
WHITE BALANCE WARNING IN
SERIAL CLOCK IN
SERIAL DATA OUT/IN
INDOOR/OUTDOOR SWITCH IN
+4.8V
INPUT INTERFACE
Q013 FADE SWITCHING
Q012 WHITE BALANCE SWITCHING
Q011 LOW LIGHT SWITCHING
Q010 RECORD SWITCHING
Q016 FOCUS ON/OFF SWITCHING
Q015 AGC ON/OFF SWITCHING
Q009, 014 PLAYBACK SWITCHING
Q008 INDOOR/OUTDOOR SWITCHING
Q007 PLAYBACK/RECORD SWITCHING
Q006 STANDBY SWITCHING
+4.8V (1)
TO IRIS/COLOR CONTROL BOARD
CN001
+4.8V OUT
AGC DISPLAY IN
ZOOM SPEED CONTROL IN
GROUND
CN003
GROUND
DŌ 0
DŌ 2
DŌ 3
DŌ 4
REC/PLAYBACK IN
AI 0
AI 1
AI 2
AI 3
D013
D014
IC002 MICRO PROCESSOR
CO7 CO6 CO5 CO4 CO3 CO2 CO1 CO0 AI3 AI2 AI1 AI0 BI3 BI2 BI1 NC BI0 EO0 EO1 EO2 EO3
CO8 CO9 CO10 CO11 Vss OSC VDD DO7 DO6 DO5 DO4 DO3 DO2 DO1 DO0 NC SNS1 SNS0 CSLCT RST TST
X001
IC005 4MHz OSCILLATOR
Vcc
1MHz OUT
IC004 MICRO PROCESSOR
Vss AI3 AI2 AI1 AI0 EO1 TST RST
CO1 CO2 CO3 OSC Vcc SNS0
D004
D003
D002
D001
D017
+1.8V
Q005 SERIAL OUT
VR001 CHARACTOR SIZE
IC003 CHARACTER GENERATOR
Vss DA0 DA1 DA2 DA3 DA4 DA5 DA6 LD1 ADM TST
OSC2 OSC1 V.SYNC H.SYNC DO3 DO2 DO1 DOO VOB VOW VDD
+4.8V(1)
CHARACTER GENERATOR
MICRO PROCESSOR BOARD (YFVPKD0801JA)
EVF DISPLAY SWITCH SELECTION
CN001
AI 2
AI 3
AI 0
AI 1
REC/PLAYBACK OUT
GROUND
DO 2
DO 3
VCR REMOTE CONTROL SWITCH SELECTION
EVF DISPLAY BOARD (YFVPKE0901JA)
VCR REMOTE CONTROL BOARD (YFVPKF0901JA)

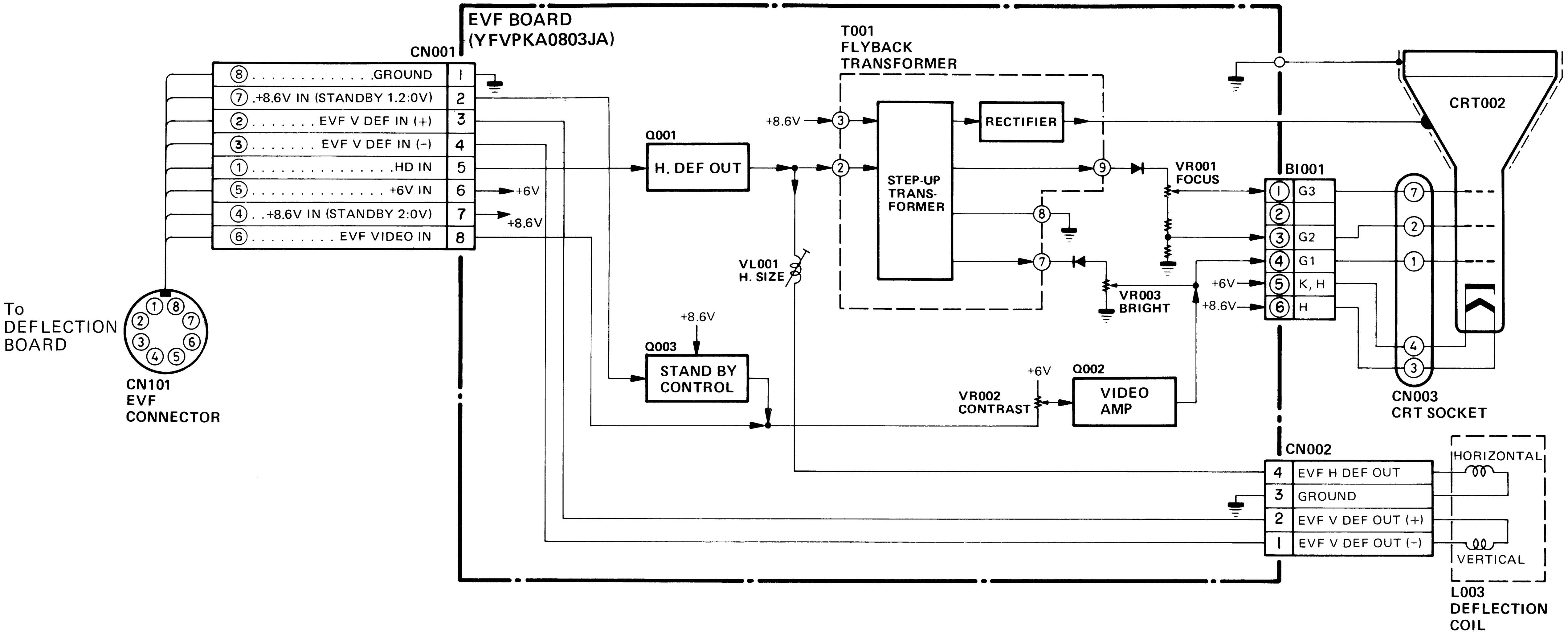
BLOCK DIAGRAM OF MICRO PROCESSOR BOARD (YFVPKC0801JA)


INPUT INTERFACE
Q012 WHITE BALANCE SWITCHING
Q011 LOW LIGHT SWITCHING
Q010 RECORD SWITCHING
Q016 FOCUS ON/OFF SWITCHING
Q015 AGC ON/OFF SWITCHING
Q008 INDOOR/OUTDOOR SWITCHING
Q007 PLAYBACK/RECORD SWITCHING
Q006 STANDBY SWITCHING
+4.8V (1)
Q005 SERIAL OUT
D013
D014
IC002 MICRO PROCESSOR
CO7 CO6 CO5 CO4 CO3 CO2 CO1 CO0 AI3 AI2 AI1 AI0 BI3 BI2 BI1 NC BI0 EO0 EO1 EO2 EO3
CO8 CO9 CO10 CO11 Vss OSC VDD DO7 DO6 DO5 DO4 DO3 DO2 DO1 DO0 NC SNS1 SNS0 CSLCT RST TST
+4.8V
X001
IC005 4MHz OSCILLATOR
Vcc
1MHz OUT
IC004 MICRO PROCESSOR
Vss AI3 AI2 AI1 AI0 EO1 TST RST
CO1 CO2 CO3 OSC Vcc SNS0
D004
D003
D002
D001
D017
Q003 INHIBIT SWITCHING
AUTOMATIC IRIS CONTROL (AIC)
IC001 AIC AMP
+1.8V
Q004 RESET
+4.8V(1)
IC001 AIC AMP
+1.8V
Q001 DISPLAY SPLITTER
+4.8V
Q002 H. SYNC INVERTER
VR001 CHARACTOR SIZE
IC003 CHARACTER GENERATOR
Vss DA0 DA1 DA2 DA3 DA4 DA5 DA6 LD1 ADM TST
OSC2 OSC1 V.SYNC H.SYNC DO3 DO2 DO1 DO0 VOB VOW VDD
+4.8V(1)
CHARACTER GENERATOR
B1001
AIC SET IN
+1.8V IN
IRIS POSITION DC OUT
TO PROCESS BOARD
AIC CONNECTOR BOARD (YFVPKG0901JA)
CN103 AIC CONNECTOR
B1001
CN002
1 GROUND
2 +4.8V OUT
3 IRIS POSITION DC IN
4 +1.8V OUT
5 AIC DRIVE OUT
6 AIC DAMPER IN
7 ZOOM (WIDE) OUT
8 ZOOM (TELE) OUT
JC
1 ZOOM SPEED CONTROL OUT
2 ZOOM (TELE) IN
3 ZOOM (WIDE) IN
4 AF ON/OFF DISPLAY IN
5 V. SYNC IN
6 CHARACTER OUT
7 BEAM DETECT IN
8 PLAYBACK CONTROL OUT
9 H. SYNC IN
10 +4.8V IN(1) (STANDBY 12:0V)
TO DEFLECTION BOARD
) (YFVPKD0801JA)
VCR REMOTE CONTROL SWITCH SELECTION
VCR REMOTE CONTROL BOARD (YFVPKF0901JA)

BLOCK DIAGRAM OF AUTO FOCUS BOARD (YFES950–24A, YFES950–24B, YFES950–24C, YFES950–24D)


TRANSMITTER
RECEIVER
IC004
+5V DC REGULATOR
+5V(b)
Q002,Q003
+9V DC REGULATOR
+9V
Q001
+9V SWITCHING
Q004,Q005
ULTRASONIC TRANS-MITTER
D004, D005
LOW LEVEL CLIPPER
D006, D007
HIGH LEVEL CLIPPER
IC002, Q006
ECHO-RECEPTION
VR001 GAIN
TP1
IC003
COMPA-RATOR
Q007
VARIABLE REFERENCE VOLTAGE
VR002 REF. V. SET
TH002
IC005(a), (b), IC006(b)
70KHz OSCILLATOR
VR003 70KHz ADJ
Q017 ~ Q020
TRAPEZOID GENERATOR
TR001 TRANS-DUCER
X001
CLOCK PULSE GENERATOR (400KHz)
IC006 (a), (c), (d)
LATCH CIRCUIT
AUTO FOCUS BOARD–D (YFES950–24D)
Vs SW
TR
OSC
OSC
REC
FF RESET
V2
IC001 MICRO PROCESSOR
CN001P
FOCUS RING POSITION DATA IN
FOCUS RING POSITION SENSOR
CN102 AF CONNECTOR
TO DEFLECTION BOARD
+5V IN
AF ON/OFF DISPLAY OUT
POWER FOCUS IN
AUTO/MAN SELECT IN
G2
Vs IN
RESET
TH1
TH2
M1
M2
①. . . . . +12V IN
+12V
③. . AF ON/OFF DISPLAY OUT
④. . . . . . . NOT USED
②. . . .AUTO/MAN SELECT IN
⑤. . . . . .GROUND
TP2
IC007
+5V DC REGULATOR
+5V(a)
Q008
POWER FOCUS IN
Q009, Q010
AUTO/MAN SELECT IN
Q011
Vs INPUT INVERTER
IC005 (c), (d), (e)
RESET PULSE GENERATOR
INTERFACE
RESET
SW001 AUTO/MAN SELECTION SWITCH
OFF
ON
SW002 AUTO/MAN SWITCH
AUTO FOCUS BOARD–C (YFES950–24C)
IC008
THERMAL CORRECTION
TEMPERATURE COMPENSATION
Q012, Q013, Q015, Q016
MOTOR DRIVING AMP
FOCUS CONTROL
M1 FOCUS MOTOR
CW
CCW
AUTO FOCUS BOARD–A (YFES950–24A)
AUTO FOCUS BOARD–B (YFES950–24B)

BLOCK DIAGRAM OF ELECTRONIC VIEWFINDER BOARD (YFVPKA0803JA)


EVF BOARD
(YFVPKA0803JA)
CN001
⑧ . . . . .GROUND 1
⑦ .+8.6V IN (STANDBY 1.2:0V) 2
② . . . . EVF V DEF IN (+) 3
③ . . . . EVF V DEF IN (-) 4
① . . . . .HD IN 5
⑤ . . . . +6V IN 6
④ . . +8.6V IN (STANDBY 2:0V) 7
⑥ . . . . EVF VIDEO IN 8
+6V
+8.6V
To
DEFLECTION
BOARD
CN101
EVF
CONNECTOR
Q001
H. DEF OUT
VL001
H. SIZE
+8.6V
Q003
STAND BY
CONTROL
T001
FLYBACK
TRANSFORMER
+8.6V
STEP-UP
TRANS-
FORMER
RECTIFIER
VR001
FOCUS
VR003
BRIGHT
+6V
Q002
VR002
CONTRAST
VIDEO
AMP
+6V
+8.6V
BI001
① G3
②
③ G2
④ G1
⑤ K, H
⑥ H
CRT002
CN003
CRT SOCKET
CN002
4 EVF H DEF OUT
3 GROUND
2 EVF V DEF OUT (+)
1 EVF V DEF OUT (-)
HORIZONTAL
VERTICAL
L003
DEFLECTION
COIL

SCHEMATIC DIAGRAM OF DEFLECTION BOA

DEFLECTION BOARD

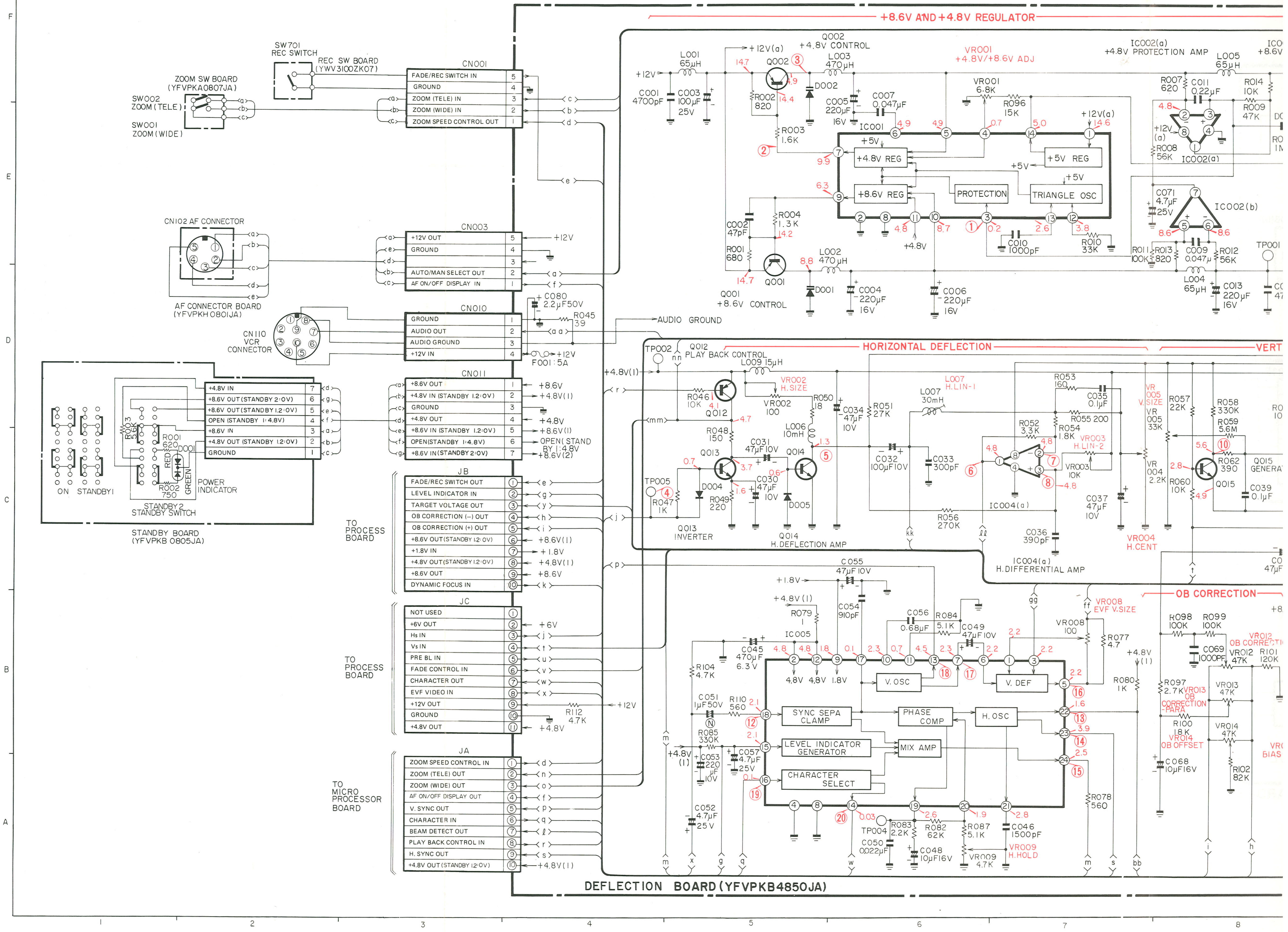
IC001	NJM2048M	E6, E7
IC002	NJM2903M	E8
IC003	NJM3415M	C10, E12
IC004	NJM3415M	C7, C9
IC005	AN2510	B6, B7
Q001	2SA715-BC	D5
Q002	2SA715-BC	F5
Q003	2SB641-QRS	E10
Q004	2SB641-QRS	E10
Q005	2SB641-QRS	E9
Q006	2SB641-QRS	E9
Q007	2SB745-STU	E11
Q008	2SD636-QR	E11
Q009	2SC1327-STU	E12
Q010	2SD636-QR	E13
Q011	2SD661-STU	E14
Q012	2SB643-QRS	D5
Q013	2SD638-QR	C5
Q014	2SD975	C5
Q015	2SD661-STU	C8
Q016	2SD638-QR	D11
Q017	2SB643-QRS	C11
Q018	2SB788-STU	D12
Q019	2SD958-RST	C11
Q020	2SB788-STU	C12
Q021	2SD639-QRS	C12
Q022	2SB788-STU	C13
Q023	2SD638-QR	A9
Q024	2SD975	A10
Q025	2SB641-QRS	A9
D001	EK14	D5
D002	EK14	F5
D003	MA165	E13
D004	MA165	C5
D005	MA165	C5
D007	MA165	A9
D008	ES01F	B11
D009	MA171	B11
D010	MA171	A11
D012	MA165	E8

STANDBY BOARD

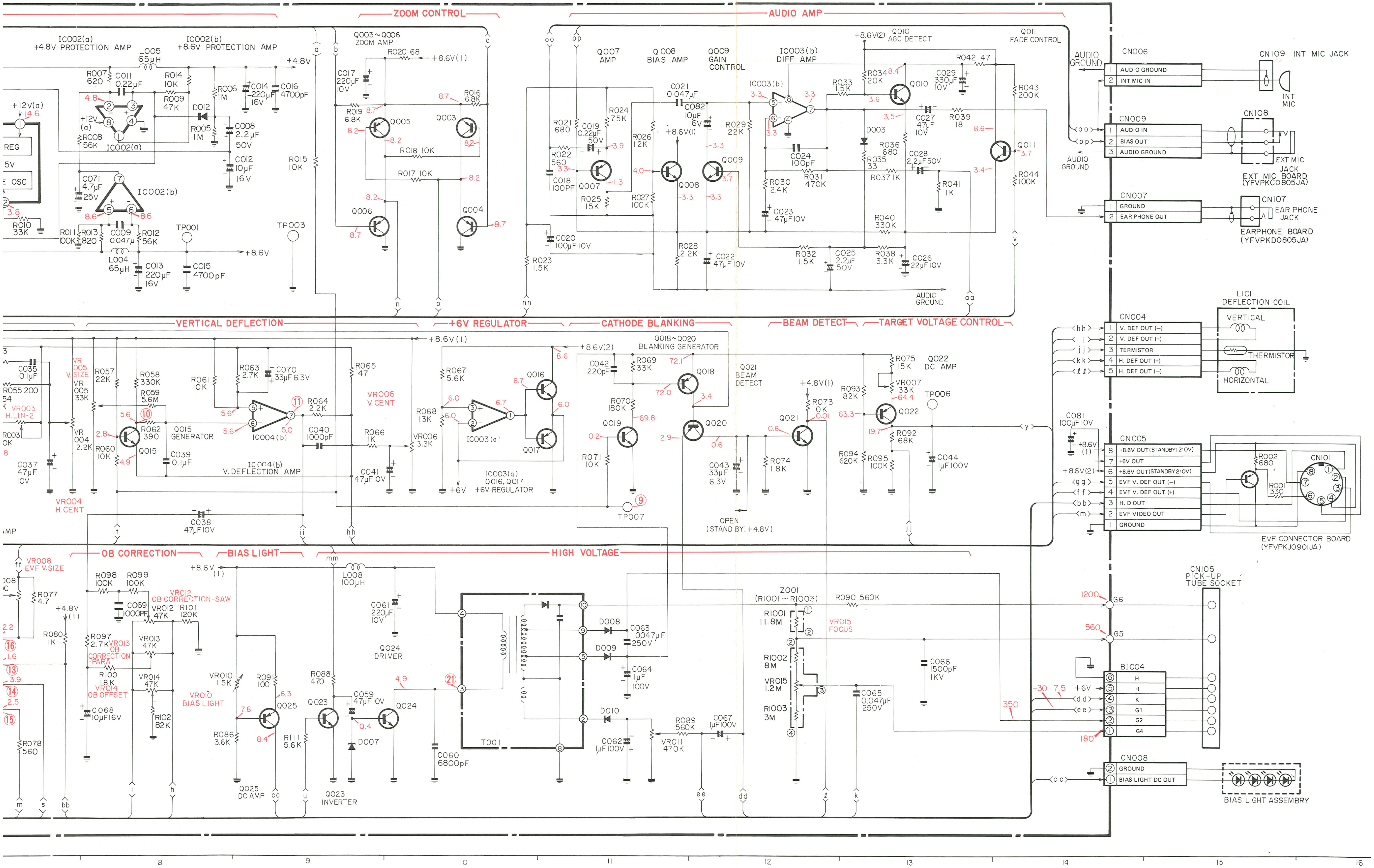
D001	GL9NP2H	C1

EVF CONNECTOR BOARD

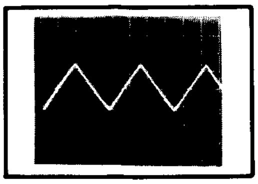
Q001	2SB709-QRSTW	C15

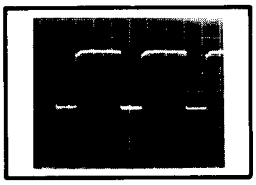

F
E
D
C
B
A
1
2
3
4
5
6
7
8
SW701
REC SWITCH
REC SW BOARD
(YWV3100ZK07)
ZOOM SW BOARD
(YFVPKA0807JA)
SW002
ZOOM (TELE)
SW001
ZOOM (WIDE)
CN001
FADE/REC SWITCH IN
GROUND
ZOOM (TELE) IN
ZOOM (WIDE) IN
ZOOM SPEED CONTROL OUT
CN102 AF CONNECTOR
AF CONNECTOR BOARD
(YFVPKH0801JA)
CN003
+12V OUT
GROUND
AUTO/MAN SELECT OUT
AF ON/OFF DISPLAY IN
CN110
VCR
CONNECTOR
CN010
GROUND
AUDIO OUT
AUDIO GROUND
+12V IN
C080
2.2µF50V
R045
39
F001 5A
AUDIO GROUND
CN011
+8.6V OUT
+4.8V IN (STANDBY 1.2:0V)
GROUND
+4.8V OUT
+8.6V IN (STANDBY 1.2:0V)
OPEN(STANDBY 1:4.8V)
+8.6V IN(STANDBY 2:0V)
+4.8V IN
+8.6V OUT (STANDBY 2:0V)
+8.6V OUT (STANDBY 1.2:0V)
OPEN (STANDBY 1:4.8V)
+8.6V IN
+4.8V OUT (STANDBY 1.2:0V)
GROUND
R001
620
D001
RED
GREEN
R002
750
POWER
INDICATOR
ON
STANDBY1
STANDBY2
STANDBY SWITCH
STANDBY BOARD
(YFVPKB0805JA)
JB
FADE/REC SWITCH OUT
LEVEL INDICATOR IN
TARGET VOLTAGE OUT
OB CORRECTION (–) OUT
OB CORRECTION (+) OUT
+8.6V OUT(STANDBY 1.2:0V)
+1.8V IN
+4.8V OUT(STANDBY 1.2:0V)
+8.6V OUT
DYNAMIC FOCUS IN
TO
PROCESS
BOARD
JC
NOT USED
+6V OUT
Hs IN
Vs IN
PRE BL IN
FADE CONTROL IN
CHARACTER OUT
EVF VIDEO IN
+12V OUT
GROUND
+4.8V OUT
R112
4.7K
JA
ZOOM SPEED CONTROL IN
ZOOM (TELE) OUT
ZOOM (WIDE) OUT
AF ON/OFF DISPLAY OUT
V. SYNC OUT
CHARACTER IN
BEAM DETECT OUT
PLAY BACK CONTROL IN
H. SYNC OUT
+4.8V OUT (STANDBY 1.2:0V)
TO
MICRO
PROCESSOR
BOARD
+8.6V AND +4.8V REGULATOR
Q002
+4.8V CONTROL
L001
65µH
L003
470µH
D002
C001
4700pF
C003
100µF
25V
R002
820
C005
220µF
16V
C007
0.047µF
VR001
+4.8V/+8.6V ADJ
VR001
6.8K
R096
15K
IC001
+4.8V REG
+8.6V REG
PROTECTION
+5V REG
TRIANGLE OSC
R003
1.6K
R004
1.3K
C002
47pF
R001
680
Q001
+8.6V CONTROL
L002
470µH
D001
C004
220µF
16V
C006
220µF
16V
C010
1000pF
R010
33K
IC002(a)
+4.8V PROTECTION AMP
L005
65µH
R007
620
C011
0.22µF
R014
10K
R009
47K
R008
56K
IC002(a)
C071
4.7µF
25V
IC002(b)
R011
100K
R013
820
C009
0.047µ
R012
56K
L004
65µH
C013
220µF
16V
TP001
HORIZONTAL DEFLECTION
TP002
Q012
PLAY BACK CONTROL
L009 15µH
VR002
H. SIZE
VR002
100
R046
10K
R050
18
C034
47µF
10V
R051
27K
L007
H. LIN-1
L007
30mH
L006
10mH
R048
150
C031
47µF 10V
Q013
Q014
D004
R049
220
C030
47µF
10V
D005
TP005
R047
1K
Q013
INVERTER
Q014
H. DEFLECTION AMP
C032
100µF10V
C033
300pF
R056
270K
R053
160
C035
0.1µF
R055 200
R052
3.3K
R054
1.8K
VR003
H. LIN-2
VR003
10K
IC004(a)
C036
390pF
IC004(a)
H. DIFFERENTIAL AMP
C037
47µF
10V
VR004
H. CENT
VR005
V. SIZE
VR005
33K
R057
22K
R058
330K
R059
5.6M
VR004
2.2K
R060
10K
R062
390
Q015
Q015
GENERA
C039
0.1µF
VERT
C055
47µF 10V
C054
910pF
R079
IC005
C045
470µF
6.3V
C056
0.68µF
R084
5.1K
C049
47µF 10V
R104
4.7K
C051
1µF50V
R110
560
R085
330K
C053
220µF
10V
C057
4.7µF
25V
C052
4.7µF
25V
V. OSC
V. DEF
SYNC SEPA
CLAMP
PHASE
COMP
H. OSC
LEVEL INDICATOR
GENERATOR
MIX AMP
CHARACTER
SELECT
TP004
R083
2.2K
R082
62K
C050
0.022µF
C048
10µF16V
VR009
4.7K
R087
5.1K
C046
1500pF
VR009
H. HOLD
VR008
EVF V. SIZE
VR008
100
R077
4.7
R080
1K
R078
560
OB CORRECTION
R098
100K
R099
100K
C069
1000pF
VR012
OB CORRECTION
VR012
47K
R101
120K
R097
2.7K
VR013
OB CORRECTION PARA
VR013
47K
R100
18K
VR014
OB OFFSET
VR014
47K
C068
10µF16V
R102
82K
DEFLECTION BOARD (YFVPKB4850JA)

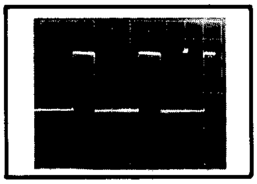
F DEFLECTION BOARD (YFVPKA4850JA)

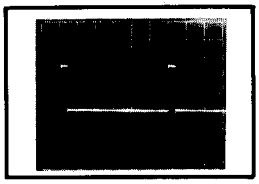

ZOOM CONTROL
AUDIO AMP
VERTICAL DEFLECTION
+6V REGULATOR
CATHODE BLANKING
BEAM DETECT
TARGET VOLTAGE CONTROL
OB CORRECTION
BIAS LIGHT
HIGH VOLTAGE
IC002(a) +4.8V PROTECTION AMP
IC002(b) +8.6V PROTECTION AMP
IC002(a)
IC002(b)
L005 65μH
L004 65μH
+4.8V
+12V(a)
+8.6V
REG
5V
OSC
TP001
TP003
Q003~Q006 ZOOM AMP
Q003
Q004
Q005
Q006
R020 68
R016 6.8K
R019 6.8K
R018 10K
R017 10K
R015 10K
C017 220μF 10V
+8.6V(1)
Q007 AMP
Q008 BIAS AMP
Q009 GAIN CONTROL
IC003(b) DIFF AMP
+8.6V(2)
Q010 AGC DETECT
Q011 FADE CONTROL
C021 0.047μF
C082 10μF 16V
C029 330μF 10V
C027 47μF 10V
C028 2.2μF 50V
C024 100pF
C023 47μF 10V
C020 100μF 10V
C022 47μF 10V
C025 2.2μF 50V
C026 22μF 10V
D003
AUDIO GROUND
CN006
AUDIO GROUND
INT MIC IN
CN109 INT MIC JACK
INT MIC
CN009
AUDIO IN
BIAS OUT
AUDIO GROUND
CN108
EXT MIC JACK
EXT MIC BOARD (YFVPKC0805JA)
CN007
GROUND
EAR PHONE OUT
CN107
EAR PHONE JACK
EARPHONE BOARD (YFVPKD0805JA)
L101 DEFLECTION COIL
VERTICAL
THERMISTOR
HORIZONTAL
CN004
V. DEF OUT (–)
V. DEF OUT (+)
TERMISTOR
H. DEF OUT (+)
H. DEF OUT (–)
CN005
+8.6V OUT(STANDBY:2.0V)
+6V OUT
+8.6V OUT(STANDBY:2.0V)
EVF V. DEF OUT (–)
EVF V. DEF OUT (+)
H. D OUT
EVF VIDEO OUT
GROUND
CN101
R002 680
R001 330
EVF CONNECTOR BOARD (YFVPKJ0901JA)
VR005 V.SIZE
VR003 H.LIN-2
VR004 H.CENT
Q015 GENERATOR
IC004(b)
IC004(b) V.DEFLECTION AMP
VR006 V.CENT
IC003(a)
IC003(a) Q016, Q017 +6V REGULATOR
Q016
Q017
Q018~Q020 BLANKING GENERATOR
Q018
Q019
Q020
Q021 BEAM DETECT
Q022 DC AMP
VR007 33K
TP006
TP007
OPEN (STAND BY: +4.8V)
C081 100μF 10V
VR008 EVF V.SIZE
VR012 OB CORRECTION-SAW
VR013 OB CORRECTION-PARA
VR014 OB OFFSET
VR010 BIAS LIGHT
Q025 DC AMP
Q023 INVERTER
Q024 DRIVER
L008 100μH
T001
D008
D009
D010
D007
C063 0.047μF 250V
C064 1μF 100V
C062 1μF 100V
C060 6800pF
C059 47μF 10V
C061 220μF 10V
Z001 (R1001 ~ R1003)
R1001 11.8M
R1002 8M
VR015 1.2M
R1003 3M
VR015 FOCUS
R090 560K
C066 1500pF 1KV
C065 0.047μF 250V
R089 560K
VR011 470K
C067 1μF 100V
CN105 PICK-UP TUBE SOCKET
G6
G5
B1004
H
H
K
G1
G2
G4
1200
560
350
180
–30
7.5
+6V
CN008
GROUND
BIAS LIGHT DC OUT
BIAS LIGHT ASSEMBRY
8
9
10
11
12
13
14
15
16

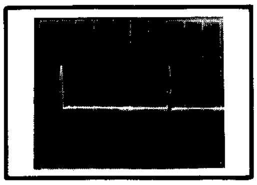
SIGNAL WAVEFORMS OF DEFLECTION CIRCUIT BOARD

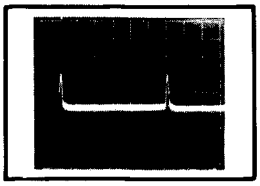

1 0.5V/DIV, 5μs/DIV

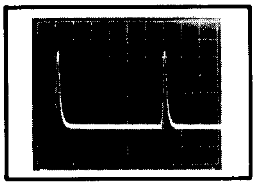

2 5V/DIV, 5μs/DIV

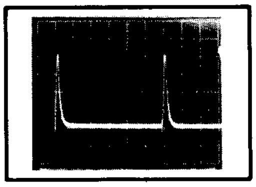

3 5V/DIV, 5μs/DIV

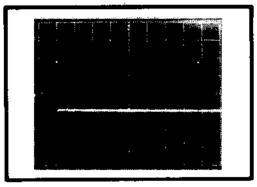

4 2V/DIV, 10μs/DIV

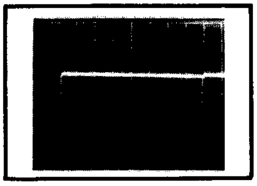

5 50V/DIV, 10μs/DIV

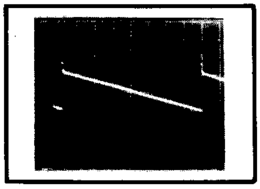

6 0.2V/DIV, 10μs/DIV

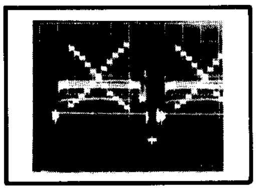

7 0.2V/DIV 10μs/DIV

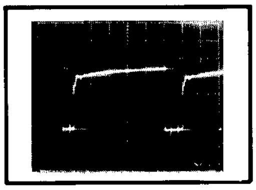

8 0.2V/DIV, 10μs/DIV

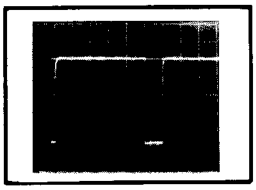

9 2V/DIV, 2ms/DIV

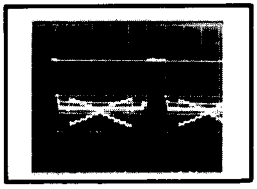

10 0.5V/DIV, 2ms/DIV

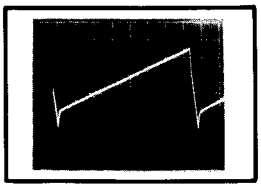

11 2V/DIV, 2ms/DIV

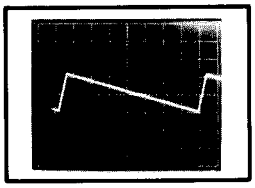

12 0.2V/DIV, 10μs/DIV

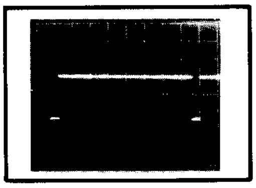

13 0.5V/DIV, 10μs/DIV

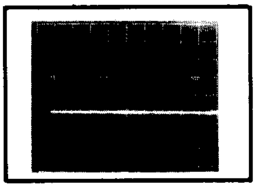

14 1V/DIV, 10μs/DIV

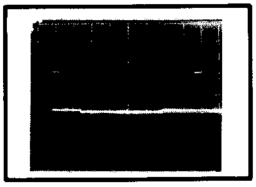

15 1V/DIV, 10μs/DIV

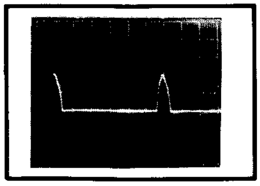

16 0.5V/DIV, 2ms/DIV


17 0.5V/DIV, 2ms/DIV

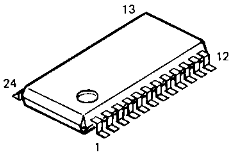

18 2V/DIV, 2ms/DIV


19 2V/DIV, 2ms/DIV

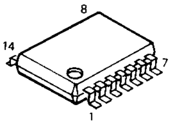

20 0.5V/DIV, 2ms/DIV


21 50V/DIV, 10μs/DIV

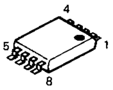
AN2510



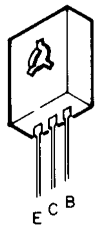
NJM2048M



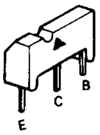
NJM2093M
NJM3415M



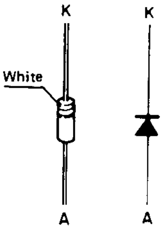
2SA715-BC
2SD975



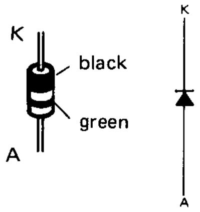
2SB641-QRS
2SB643-QRS
2SB745-STU
2SB788-STU
2SC1327-STU
2SD636-QR
2SD638-QR
2SD639-QRS
2SD661-STU
2SD958-RST



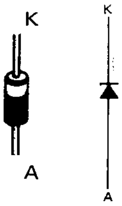
MA165
ISS133



MA171

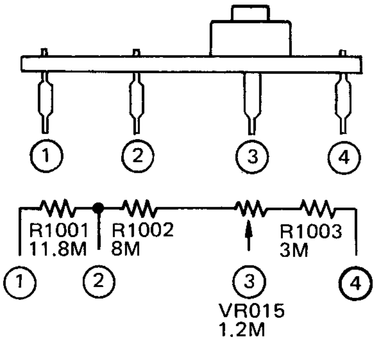


ES01F



BLOCK RESISTOR

Z001 EVM72GA00089



DEFLECTION BOARD

IC001	NJM2048M	D3
IC002	NJM2903M	C3
IC003	NJM3415M	D5, D6
IC004	NJM3415M	D6
IC005	AN2510	C5
Q001	2SA715-BC	C3
Q002	2SA715-BC	C3
Q003	2SB641-QRS	C7
Q004	2SB641-QRS	C7
Q005	2SB641-QRS	C7
Q006	2SB641-QRS	C7
Q007	2SB745-STU	D4
Q008	2SD636-QR	D4
Q009	2SC1327-STU	D5
Q010	2SD636-QR	C5
Q011	2SD661-STU	D5
Q012	2SB643-QRS	C6
Q013	2SD638-QR	C6
Q014	2SD975	C6
Q015	2SD661-STU	C7
Q016	2SD638-QR	D6
Q017	2SB643-QRS	D6
Q018	2SB788-STU	C4
Q019	2SD958-RST	C4
Q020	2SB788-STU	C4
Q021	2SD639-QRS	C4
Q022	2SB788-STU	C6
Q023	2SD638-QR	C4
Q024	2SD975	C4
Q025	2SB641-QRS	C4
D001	EK14	C3
D002	EK14	C3
D003	MA165	C5
D004	MA165	C6
D005	MA165	C6
D007	MA165	C4
D008	ES01F	B3
D009	MA171	C3
D010	MA171	C3
D012	MA165	D2

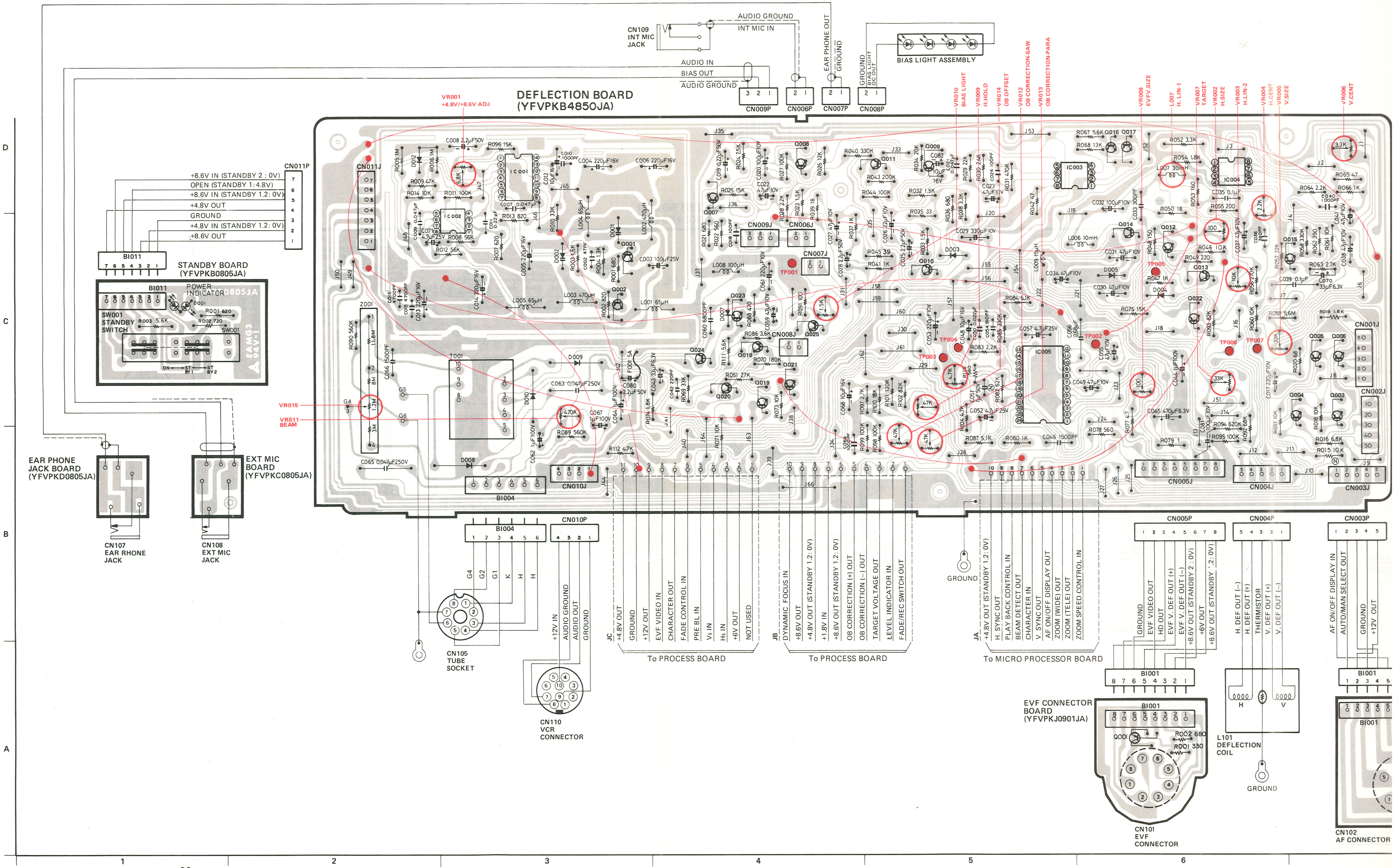
STANDBY BOARD

D001	GL9NP2H	C1

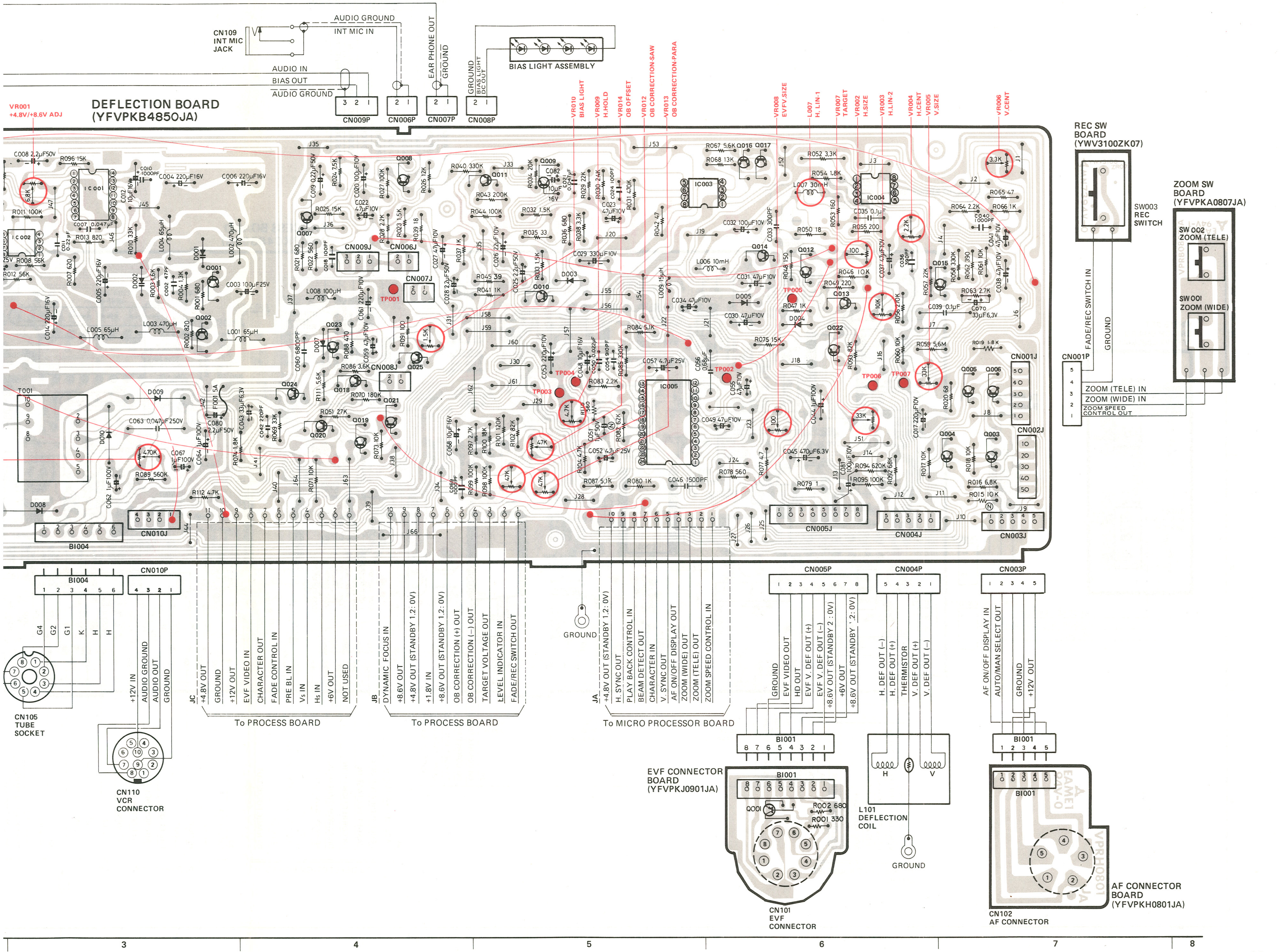
EVF CONNECTOR BOARD

Q001	2SB709-QRSTW	A6

CONDUCTOR VIEW OF DEFLECTION BOARD (YFVPKA4850JA)


DEFLECTION BOARD
(YFVPKB4850JA)
CN109
INT MIC
JACK
AUDIO GROUND
INT MIC IN
AUDIO IN
BIAS OUT
AUDIO GROUND
EAR PHONE OUT
GROUND
GROUND
BIAS LIGHT DC OUT
BIAS LIGHT ASSEMBLY
CN009P
CN006P
CN007P
CN008P
VR001
+4.8V/+8.6V ADJ
VR010
BIAS LIGHT
VR009
H.HOLD
VR014
OB OFFSET
VR012
OB CORRECTION SAW
VR013
OB CORRECTION PARA
VR008
EVF V.SIZE
L007
H. LIN-1
VR007
TARGET
VR002
H.SIZE
VR003
H.LIN-2
VR004
H.CENT
VR005
V.SIZE
VR006
V.CENT
VR015
VR011
BEAM
CN011P
+8.6V IN (STANDBY 2 : 0V)
OPEN (STANDBY 1 : 4.8V)
+8.6V IN (STANDBY 1.2 : 0V)
+4.8V OUT
GROUND
+4.8V IN (STANDBY 1.2 : 0V)
+8.6V OUT
BI011
STANDBY BOARD
(YFVPKB0805JA)
POWER
INDICATOR
SW001
STANDBY
SWITCH
ON
ST BY1
ST BY2
EAR PHONE
JACK BOARD
(YFVPKD0805JA)
EXT MIC
BOARD
(YFVPKC0805JA)
CN107
EAR RHONE
JACK
CN108
EXT MIC
JACK
CN011J
CN009J
CN006J
CN007J
CN008J
CN010J
CN005J
CN004J
CN003J
CN001J
CN002J
IC001
IC002
IC003
IC004
IC005
T001
TP001
TP002
TP003
TP004
TP005
TP006
TP007
BI004
G4
G2
G1
K
H
H
CN105
TUBE
SOCKET
CN010P
+12V IN
AUDIO GROUND
AUDIO OUT
GROUND
CN110
VCR
CONNECTOR
JC
+4.8V OUT
GROUND
+12V OUT
EVF VIDEO IN
CHARACTER OUT
FADE CONTROL IN
PRE BL IN
Vs IN
Hs IN
+6V OUT
NOT USED
To PROCESS BOARD
JB
DYNAMIC FOCUS IN
+8.6V OUT
+4.8V OUT (STANDBY 1.2: 0V)
+1.8V IN
+8.6V OUT (STANDBY 1.2: 0V)
OB CORRECTION (+) OUT
OB CORRECTION (–) OUT
TARGET VOLTAGE OUT
LEVEL INDICATOR IN
FADE/REC SWITCH OUT
To PROCESS BOARD
GROUND
JA
+4.8V OUT (STANDBY 1.2: 0V)
H. SYNC OUT
PLAY BACK CONTROL IN
BEAM DETECT OUT
CHARACTER IN
V. SYNC OUT
AF ON/OFF DISPLAY OUT
ZOOM (WIDE) OUT
ZOOM (TELE) OUT
ZOOM SPEED CONTROL IN
To MICRO PROCESSOR BOARD
CN005P
GROUND
EVF VIDEO OUT
HD OUT
EVF V. DEF OUT (+)
EVF V. DEF OUT (–)
+8.6V OUT (STANDBY 2 : 0V)
+6V OUT
+8.6V OUT (STANDBY 2 : 0V)
CN004P
H. DEF OUT (–)
H. DEF OUT (+)
THERMISTOR
V. DEF OUT (+)
V. DEF OUT (–)
CN003P
AF ON/OFF DISPLAY IN
AUTO/MAN SELECT OUT
GROUND
+12V OUT
BI001
EVF CONNECTOR
BOARD
(YFVPKJ0901JA)
Q001
R002 680
R001 330
CN101
EVF
CONNECTOR
L101
DEFLECTION
COIL
GROUND
CN102
AF CONNECTOR
D
C
B
A
1
2
3
4
5
6

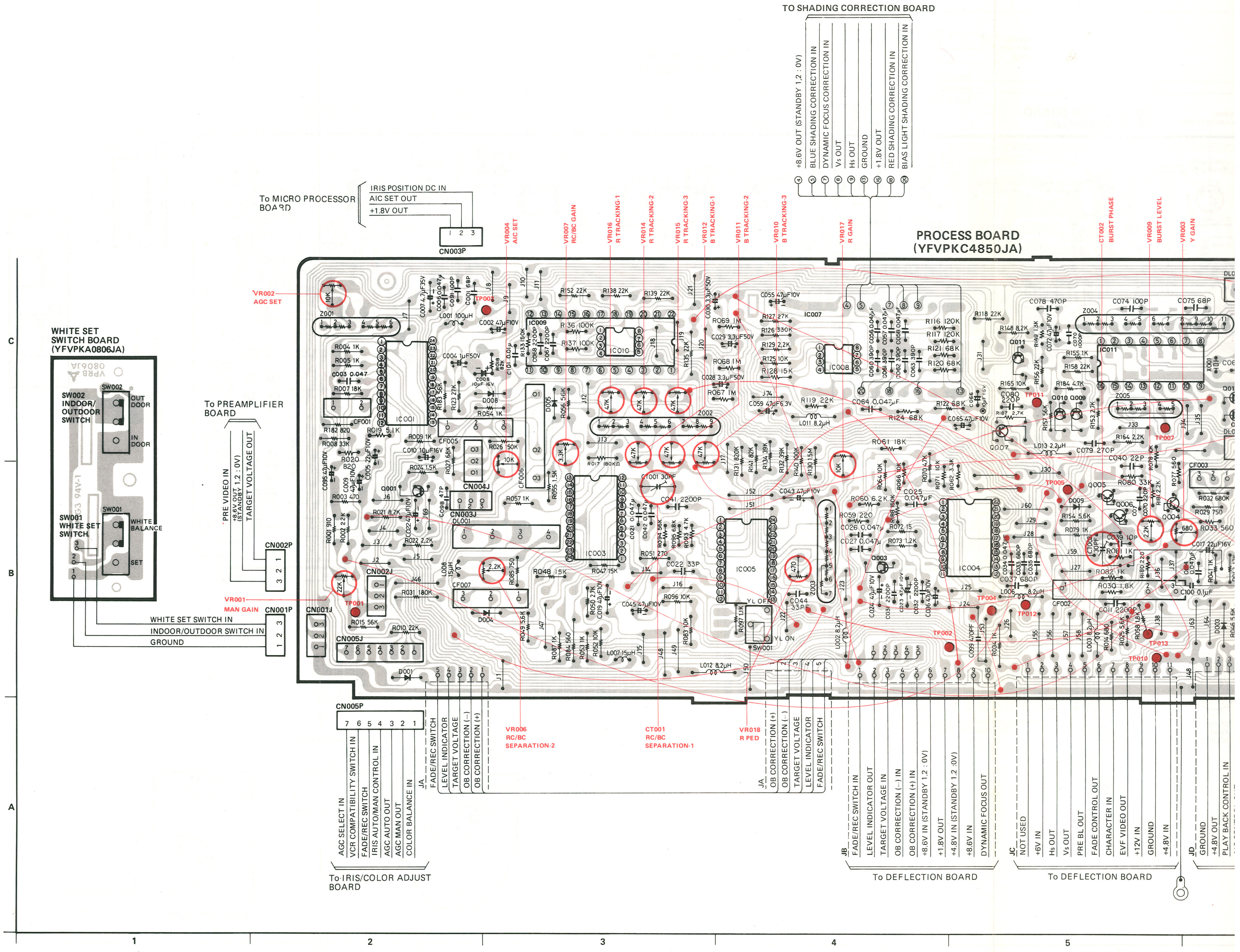
CONDUCTOR VIEW OF DEFLECTION BOARD (YFVPKA4850JA)



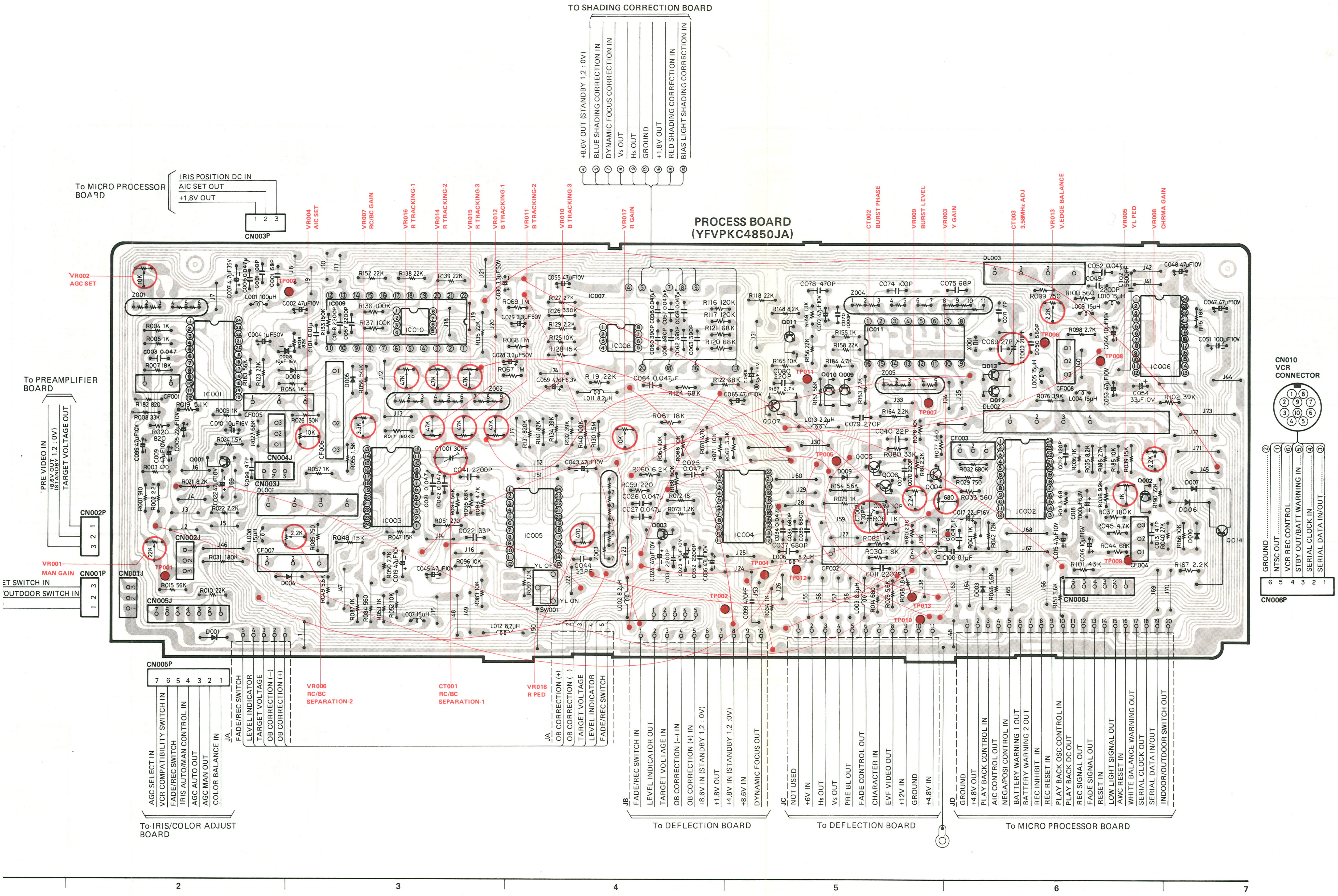
CN109
INT MIC
JACK
AUDIO GROUND
INT MIC IN
AUDIO IN
BIAS OUT
AUDIO GROUND
EAR PHONE OUT
GROUND
GROUND
BIAS LIGHT
DC OUT
BIAS LIGHT ASSEMBLY
CN009P
CN006P
CN007P
CN008P
VR001
+4.8V/+8.6V ADJ
DEFLECTION BOARD
(YFVPKB4850JA)
VR010
BIAS LIGHT
VR009
H.HOLD
VR014
OB OFFSET
VR012
OB CORRECTION-SAW
VR013
OB CORRECTION-PARA
VR008
EVF SIZE
L007
H. LIN-1
VR007
TARGET
VR002
H.SIZE
VR003
H.LIN-2
VR004
H.CENT
VR005
V.SIZE
VR006
V.CENT
REC SW
BOARD
(YWV3100ZK07)
SW003
REC
SWITCH
ZOOM SW
BOARD
(YFVPKA0807JA)
SW 002
ZOOM (TELE)
SW 001
ZOOM (WIDE)
FADE/REC SWITCH IN
GROUND
CN001P
ZOOM (TELE) IN
ZOOM (WIDE) IN
ZOOM SPEED
CONTROL OUT
IC001
IC002
IC003
IC004
IC005
TP001
TP002
TP003
TP004
TP005
TP006
TP007
T001
CN009J
CN006J
CN007J
CN008J
CN001J
CN002J
CN003J
CN004J
CN005J
CN010J
BI004
CN010P
G4
G2
G1
K
H
H
CN105
TUBE
SOCKET
+12V IN
AUDIO GROUND
AUDIO OUT
GROUND
CN110
VCR
CONNECTOR
JC
+4.8V OUT
GROUND
+12V OUT
EVF VIDEO IN
CHARACTER OUT
FADE CONTROL IN
PRE BL IN
Vs IN
Hs IN
+6V OUT
NOT USED
To PROCESS BOARD
JB
DYNAMIC FOCUS IN
+8.6V OUT
+4.8V OUT (STANDBY 1.2: 0V)
+1.8V IN
+8.6V OUT (STANDBY 1.2: 0V)
OB CORRECTION (+) OUT
OB CORRECTION (–) OUT
TARGET VOLTAGE OUT
LEVEL INDICATOR IN
FADE/REC SWITCH OUT
To PROCESS BOARD
GROUND
JA
+4.8V OUT (STANDBY 1.2: 0V)
H. SYNC OUT
PLAY BACK CONTROL IN
BEAM DETECT OUT
CHARACTER IN
V. SYNC OUT
AF ON/OFF DISPLAY OUT
ZOOM (WIDE) OUT
ZOOM (TELE) OUT
ZOOM SPEED CONTROL IN
To MICRO PROCESSOR BOARD
CN005P
GROUND
EVF VIDEO OUT
HD OUT
EVF V. DEF OUT (+)
EVF V. DEF OUT (–)
+8.6V OUT (STANDBY 2 : 0V)
+6V OUT
+8.6V OUT (STANDBY 1.2: 0V)
CN004P
H. DEF OUT (–)
H. DEF OUT (+)
THERMISTOR
V. DEF OUT (+)
V. DEF OUT (–)
CN003P
AF ON/OFF DISPLAY IN
AUTO/MAN SELECT OUT
GROUND
+12V OUT
BI001
EVF CONNECTOR
BOARD
(YFVPKJ0901JA)
Q001
R002 680
R001 330
CN101
EVF
CONNECTOR
L101
DEFLECTION
COIL
H
V
GROUND
AF CONNECTOR
BOARD
(YFVPKH0801JA)
CN102
AF CONNECTOR
3
4
5
6
7
8

CONDUCTOR VIEW OF PROCESS BOARD (YFVPKB4850JA)

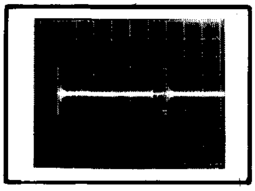
IC001	AN2110S	C2
IC002	AN2210S	B6
IC003	AN2310S	B3
IC004	AN2410S	B5
IC005	AN2320S	B4
IC006	AN2560S	C6
IC008	NJM3414M	C4
IC009	MN6164	C3
IC010	AN6914S	C3
IC011	MN6064	C5
Q001	2SD636-QRS	B2
Q002	2SD636-QRS	B6
Q003	2SD636-QRS	B4
Q004	2SD601-QRSTW	B5
Q005	2SC2404-CDTW	B5
Q006	2SC2404-CDTW	B5
Q007	2SB643-QRS	C5
Q009	2SD636-QRS	C5
Q010	2SB641-QRS	C5
Q011	2SB641-QRS	C5
Q012	2SD636-QRS	C6
Q013	2SB641-QRS	C6
Q014	2SC828-QRS	B7
D001	MA165	B2
D003	MA165	B6
D004	MA165	B3
D005	MA165	C3
D006	MA165	B7
D007	MA165	B7
D008	MA165	C3
D009	MA165	B5
D010	MA165	B7


TO SHADING CORRECTION BOARD
+8.6V OUT (STANDBY 1.2 : 0V)
BLUE SHADING CORRECTION IN
DYNAMIC FOCUS CORRECTION IN
Vs OUT
Hs OUT
GROUND
+1.8V OUT
RED SHADING CORRECTION IN
BIAS LIGHT SHADING CORRECTION IN
To MICRO PROCESSOR BOARD
IRIS POSITION DC IN
AIC SET OUT
+1.8V OUT
CN003P
PROCESS BOARD (YFVPKC4850JA)
WHITE SET SWITCH BOARD (YFVPKA0806JA)
SW002 INDOOR/OUTDOOR SWITCH
OUT DOOR
IN DOOR
SW001 WHITE SET SWITCH
WHITE BALANCE
SET
To PREAMPLIFIER BOARD
PRE VIDEO IN
+8.6V OUT 1.2 : 0V) (STANDBY
TARGET VOLTAGE OUT
CN002P
CN001P
CN001J
CN002J
CN005J
CN005P
WHITE SET SWITCH IN
INDOOR/OUTDOOR SWITCH IN
GROUND
VR002 AGC SET
VR001 MAN GAIN
VR004 AIC SET
VR007 RC/BC GAIN
VR016 R TRACKING-1
VR014 R TRACKING-2
VR015 R TRACKING-3
VR012 B TRACKING-1
VR011 B TRACKING-2
VR010 B TRACKING-3
VR017 R GAIN
CT002 BURST PHASE
VR009 BURST LEVEL
VR003 Y GAIN
VR006 RC/BC SEPARATION-2
CT001 RC/BC SEPARATION-1
VR018 R PED
IC001
IC003
IC004
IC005
IC007
IC008
IC009
IC010
IC011
TP001
TP002
TP004
TP005
TP007
TP010
TP011
TP012
TP013
AGC SELECT IN
VCR COMPATIBILITY SWITCH IN
FADE/REC SWITCH
IRIS AUTO/MAN CONTROL IN
AGC AUTO OUT
AGC MAN OUT
COLOR BALANCE IN
To IRIS/COLOR ADJUST BOARD
JA
FADE/REC SWITCH
LEVEL INDICATOR
TARGET VOLTAGE
OB CORRECTION (-)
OB CORRECTION (+)
JB
FADE/REC SWITCH IN
LEVEL INDICATOR OUT
TARGET VOLTAGE IN
OB CORRECTION (-) IN
OB CORRECTION (+) IN
+8.6V IN (STANDBY 1.2 : 0V)
+1.8V OUT
+4.8V IN (STANDBY 1.2 : 0V)
+8.6V IN
DYNAMIC FOCUS OUT
To DEFLECTION BOARD
JC
NOT USED
+6V IN
Hs OUT
Vs OUT
PRE BL OUT
FADE CONTROL OUT
CHARACTER IN
EVF VIDEO OUT
+12V IN
GROUND
+4.8V IN
To DEFLECTION BOARD
JD
GROUND
+4.8V OUT
PLAY BACK CONTROL IN
C
B
A
1
2
3
4
5

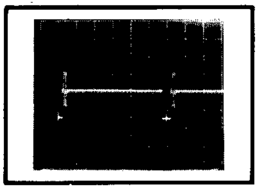
CONDUCTOR VIEW OF PROCESS BOARD (YFVPKB4850JA)


TO SHADING CORRECTION BOARD
+8.6V OUT (STANDBY 1.2 : 0V)
BLUE SHADING CORRECTION IN
DYNAMIC FOCUS CORRECTION IN
Vs OUT
Hs OUT
GROUND
+1.8V OUT
RED SHADING CORRECTION IN
BIAS LIGHT SHADING CORRECTION IN
To MICRO PROCESSOR BOARD
IRIS POSITION DC IN
AIC SET OUT
+1.8V OUT
CN003P
PROCESS BOARD
(YFVPKC4850JA)
VR002 AGC SET
VR004 AIC SET
VR007 RC/BC GAIN
VR016 R TRACKING-1
VR014 R TRACKING-2
VR015 R TRACKING-3
VR012 B TRACKING-1
VR011 B TRACKING-2
VR010 B TRACKING-3
VR017 R GAIN
CT002 BURST PHASE
VR009 BURST LEVEL
VR003 Y GAIN
CT003 3.58MHz ADJ
VR013 V.EDGE BALANCE
VR005 YL PED
VR008 CHRMA GAIN
To PREAMPLIFIER BOARD
PRE VIDEO IN
+8.6V OUT (STANDBY 1.2 : 0V)
TARGET VOLTAGE OUT
CN002P
VR001 MAN GAIN
CN001P
CN001J
SET SWITCH IN
OUTDOOR SWITCH IN
IC001
IC002
IC003
IC004
IC005
IC006
IC007
IC008
IC010
IC011
TP001
TP002
TP004
TP005
TP006
TP007
TP008
TP009
TP010
TP011
TP012
TP013
SW001
YL OFF
YL ON
CN010 VCR CONNECTOR
CN006P
CN006J
GROUND
NTSC OUT
VCR REC CONTROL
STBY OUT/BATT WARNING IN
SERIAL CLOCK IN
SERIAL DATA IN/OUT
CN005P
CN005J
AGC SELECT IN
VCR COMPATIBILITY SWITCH IN
FADE/REC SWITCH
IRIS AUTO/MAN CONTROL IN
AGC AUTO OUT
AGC MAN OUT
COLOR BALANCE IN
To IRIS/COLOR ADJUST BOARD
JA
FADE/REC SWITCH
LEVEL INDICATOR
TARGET VOLTAGE
OB CORRECTION (–)
OB CORRECTION (+)
VR006 RC/BC SEPARATION-2
CT001 RC/BC SEPARATION-1
VR018 R PED
JA
OB CORRECTION (+)
OB CORRECTION (–)
TARGET VOLTAGE
LEVEL INDICATOR
FADE/REC SWITCH
JB
FADE/REC SWITCH IN
LEVEL INDICATOR OUT
TARGET VOLTAGE IN
OB CORRECTION (–) IN
OB CORRECTION (+) IN
+8.6V IN (STANDBY 1.2 : 0V)
+1.8V OUT
+4.8V IN (STANDBY 1.2 : 0V)
+8.6V IN
DYNAMIC FOCUS OUT
To DEFLECTION BOARD
JC
NOT USED
+6V IN
Hs OUT
Vs OUT
PRE BL OUT
FADE CONTROL OUT
CHARACTER IN
EVF VIDEO OUT
+12V IN
GROUND
+4.8V IN
To DEFLECTION BOARD
JD
GROUND
+4.8V OUT
PLAY BACK CONTROL IN
AIC CONTROL OUT
NEGA/POSI CONTROL IN
BATTERY WARNING 1 OUT
BATTERY WARNING 2 OUT
REC INHIBIT IN
REC RESET IN
PLAY BACK OSC CONTROL IN
PLAY BACK DC OUT
REC SIGNAL OUT
FADE SIGNAL OUT
RESET IN
LOW LIGHT SIGNAL OUT
AWC RESET IN
WHITE BALANCE WARNING OUT
SERIAL CLOCK OUT
SERIAL DATA IN/OUT
INDOOR/OUTDOOR SWITCH OUT
To MICRO PROCESSOR BOARD
2
3
4
5
6
7

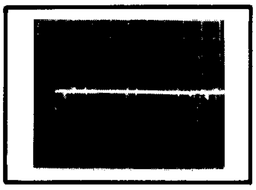
31 0.5V/DIV, 10μs/DIV



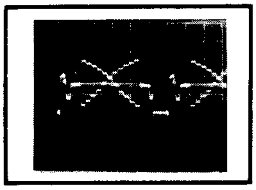
32 0.2V/DIV, 10μs/DIV



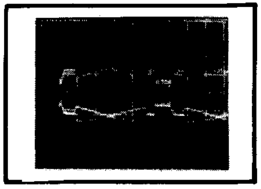
33 0.1V/DIV, 10μs/DIV



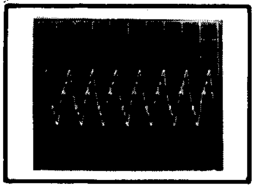
34 0.1V/DIV, 10μs/DIV



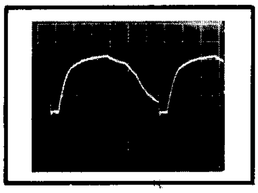
35 0.5V/DIV, 10μs/DIV



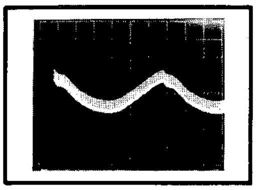
36 0.1V/DIV, 0.2μs/DIV



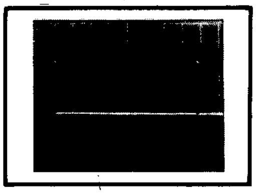
37 0.2V/DIV, 10μs/DIV



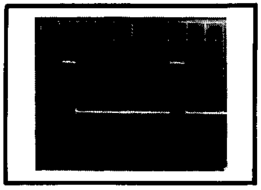
38 2V/DIV, 10μs/DIV



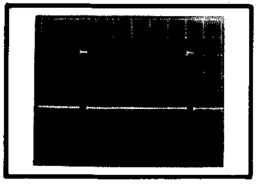
39 2V/DIV, 2ms/DIV



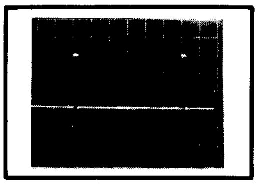
40 2V/DIV, 10μs/DIV



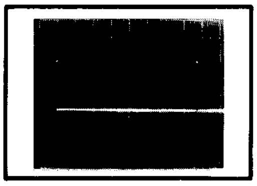
41 2V/DIV, 10μs/DIV



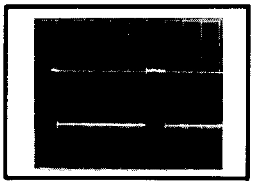
42 2V/DIV, 10μs/DIV



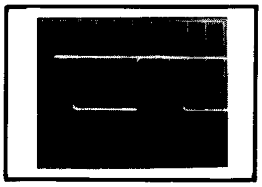
43 2V/DIV, 2ms/DIV



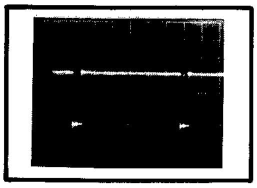
44 2V/DIV, 10μs/DIV



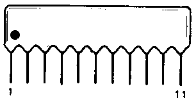
45 2V/DIV, 10μs/DIV



46 2V/DIV, 10μs/DIVV

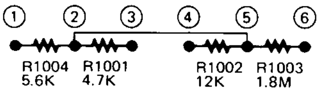


BLOCK RESISTOR

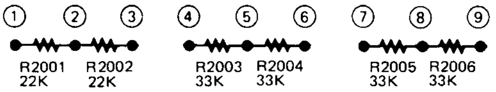


(Dot indicates pin No. 1 side)

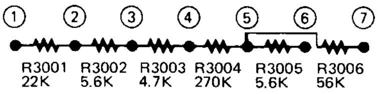
Z001
EXBH84265J


①
②
③
④
⑤
⑥
R1004 5.6K
R1001 4.7K
R1002 12K
R1003 1.8M

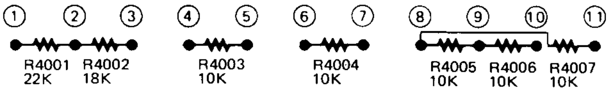
Z002
EXBH86263J


①
②
③
④
⑤
⑥
⑦
⑧
⑨
R2001 22K
R2002 22K
R2003 33K
R2004 33K
R2005 33K
R2006 33K

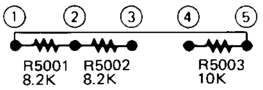
Z003
EXBD86264J


①
②
③
④
⑤
⑥
⑦
R3001 22K
R3002 5.6K
R3003 4.7K
R3004 270K
R3005 5.6K
R3006 56K

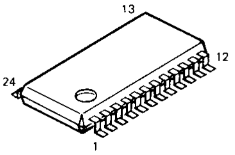
Z004
EXBD87266J


①
②
③
④
⑤
⑥
⑦
⑧
⑨
⑩
⑪
R4001 22K
R4002 18K
R4003 10K
R4004 10K
R4005 10K
R4006 10K
R4007 10K

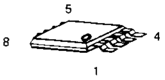
Z005
EXBH83267J


①
②
③
④
⑤
R5001 8.2K
R5002 8.2K
R5003 10K

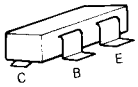
AN2110S
AN2210S
AN2310S
AN2320S
AN2560S



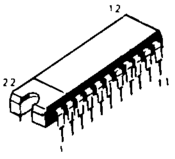
AN6914S
NJM3414M



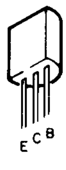
2SC2404-CDTW
2SD661-QRSTW



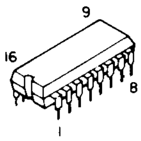
MN6164



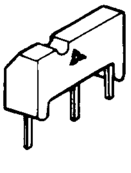
2SC828-QRS



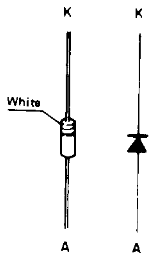
MN6064



2SB641-QRS
2SB643-QRS
2SD601-QRSTW
2SD636-QRS
2SD643-QRS

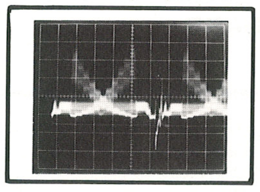


MA165

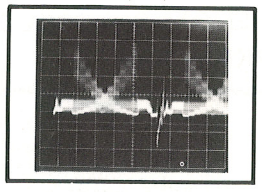


SCHE

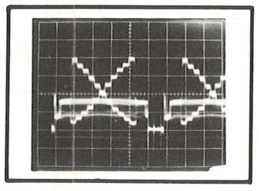
1 0.2V/DIV, 10µs/DIV



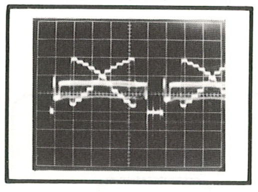
2 0.2V/DIV, 10µs/DIV



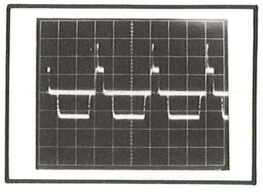
3 0.1V/DIV, 10µs/DIV



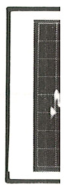
4 0.1V/DIV, 10µs/DIV



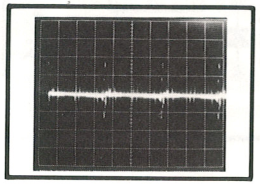
5 1V/DIV, 20µs/DIV



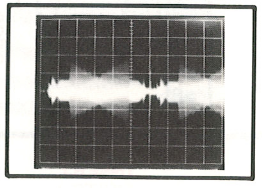
6 0.



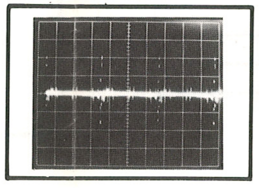
16 0.05V/DIV, 5ms/DIV



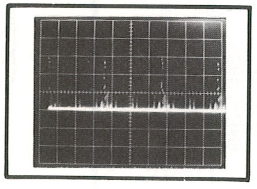
17 0.05V/DIV, 10µs/DIV



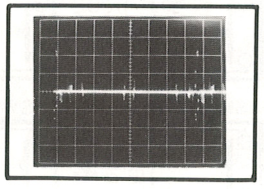
18 0.1V/DIV, 5ms/DIV



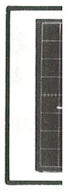
19 0.2V/DIV, 5ms/DIV

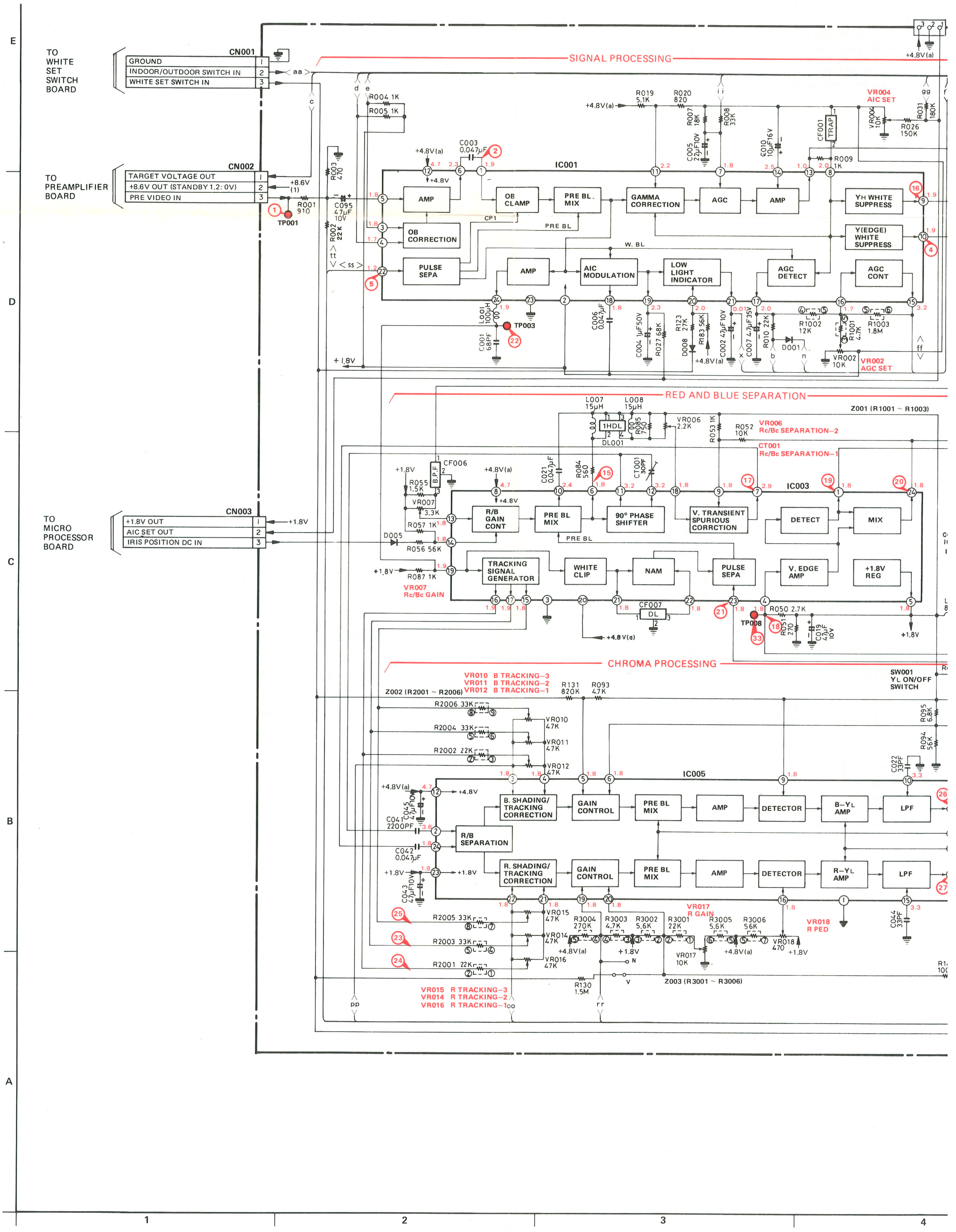


20 0.5V/DIV, 2ms/DIV



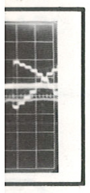
21 0.

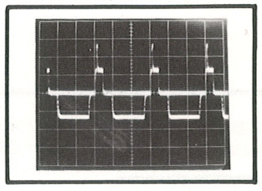


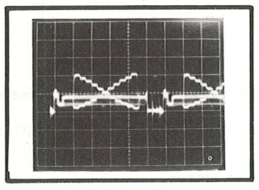


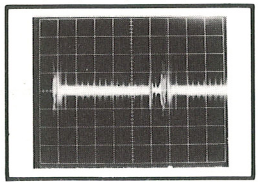
IC001	AN2110S	D2, D3, D4
IC002	AN2210S	D5, D6, D7
IC003	AN2310S	C2, C3, C4
IC004	AN2410S	C5, C6
IC005	AN2320S	B2, B3, B4
IC006	AN2560S	E8, D8
IC008	NJM3414M	B9
IC009	MN6164	B6
IC010	AN6914S	B5
IC011	MN6064	C8
Q001	2SD636-QRS	D5
Q002	2SD636-QRS	D6
Q003	2SD636-QRS	C6
Q004	2SD601-QRSTW	C7
Q005	2SC2404-CDTW	C7
Q006	2SC2404-CDTW	C7
Q007	2SB643-QRS	B7
Q009	2SD636-QRS	D8
Q010	2SB641-QRS	D8
Q011	2SB641-QRS	C9
Q012	2SD636-QRS	D8
Q013	2SB641-QRS	D8
Q014	2SC828-QRS	D9
D001	MA165	D4
D003	MA165	E7
D004	MA165	B4
D005	MA165	C2
D006	MA165	D9
D007	MA165	E8
D008	MA165	D3
D009	MA165	C8
D010	MA165	E9

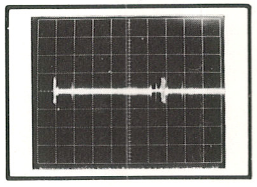
SCHEMATIC DIAGRAM OF PROCESS BOARD (YFVPKB4850JA)

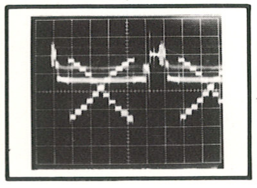

s/DIV

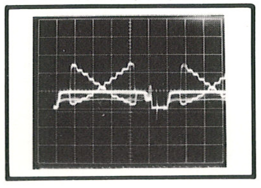

5 1V/DIV, 20μs/DIV

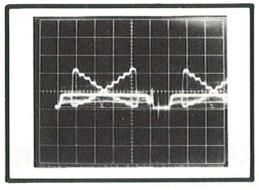

6 0.05V/DIV, 10μs/DIV

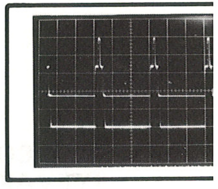

7 0.1V/DIV, 10μs/DIV

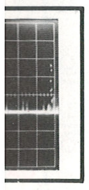

8 0.05V/DIV, 10μs/DIV

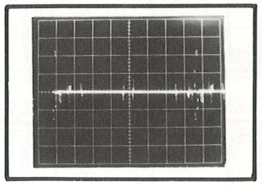

9 0.2V/DIV, 10μs/DIV

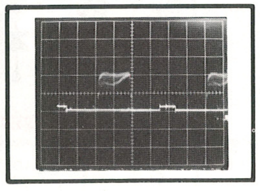

10 0.2V/DIV, 10μs/DIV

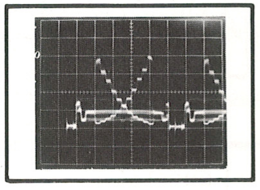

11 0.2V/DIV, 10μs/DIV

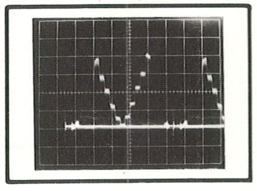

12 1V/DIV, 20μs/DI

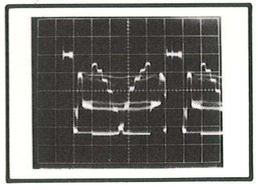

ns/DIV

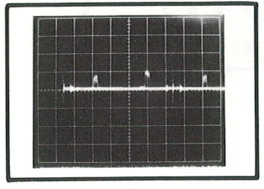

20 0.5V/DIV, 2ms/DIV

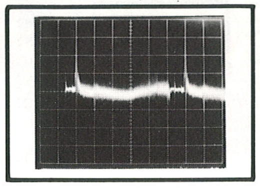

21 0.5V/DIV, 10μs/DIV

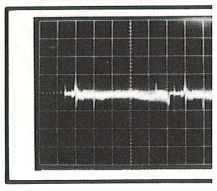

22 0.1V/DIV, 10μs/DIV

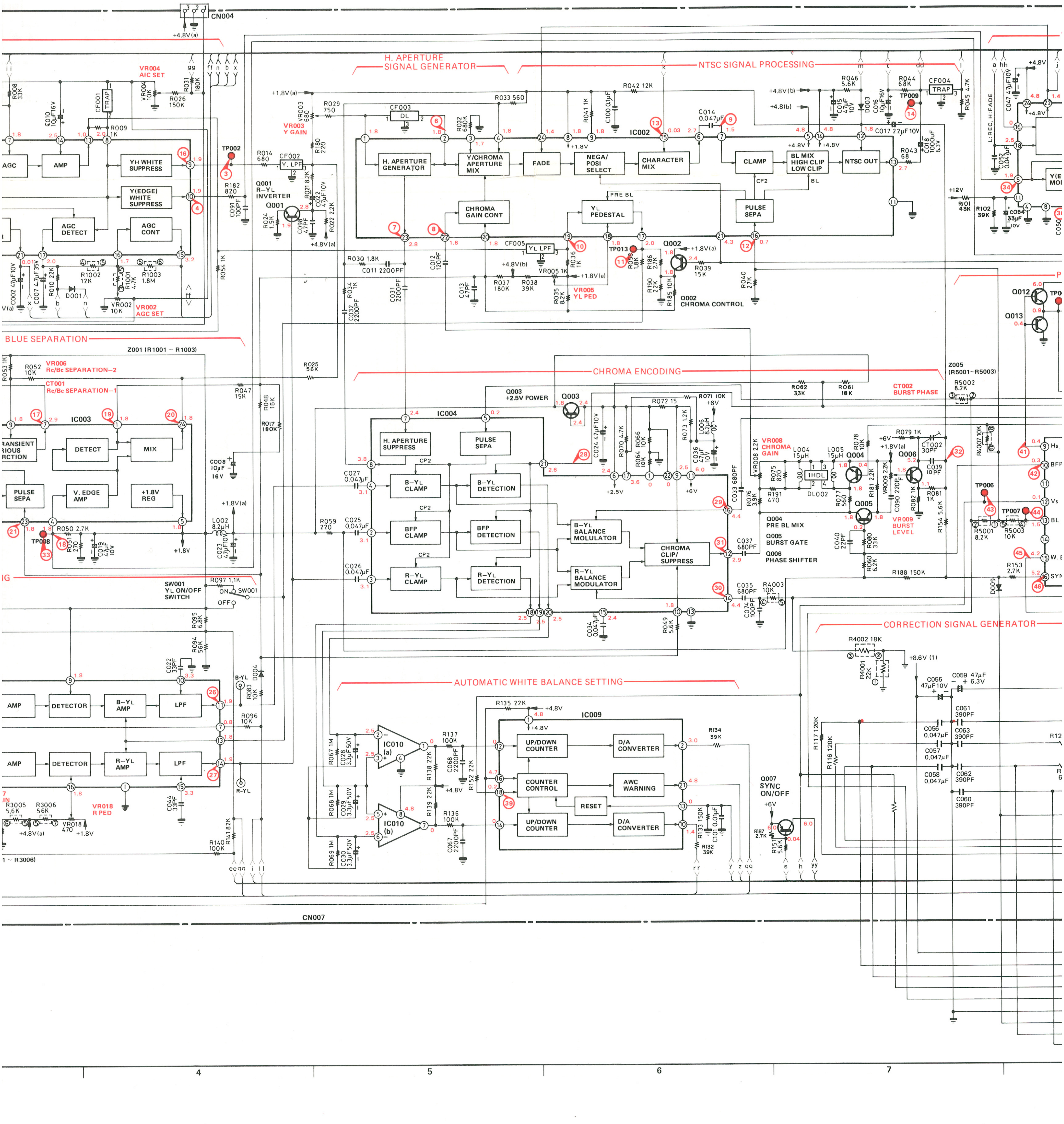

23 0.1V/DIV, 10μs/DIV


24 0.1V/DIV, 10μs/DIV


25 0.1V/DIV, 10μs/DIV

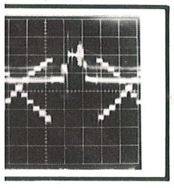

26 0.1V/DIV, 10μs/DIV


27 0.1V/DIV, 10μs/D

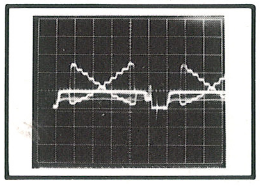

CN004
+4.8V(a)
H. APERTURE SIGNAL GENERATOR
NTSC SIGNAL PROCESSING
VR004 AIC SET
VR003 Y GAIN
TP002
CF002 Y. LPF
CF003 DL
Q001 R-YL INVERTER
IC002
H. APERTURE GENERATOR
Y/CHROMA APERTURE MIX
FADE
NEGA/ POSI SELECT
CHARACTER MIX
CLAMP
BL MIX HIGH CLIP LOW CLIP
NTSC OUT
CHROMA GAIN CONT
YL PEDESTAL
PRE BL
PULSE SEPA
CF004 TRAP
TP009
CF001 TRAP
AGC
AMP
YH WHITE SUPPRESS
Y(EDGE) WHITE SUPPRESS
AGC DETECT
AGC CONT
VR002 AGC SET
CF005 YL LPF
TP013
Q002 CHROMA CONTROL
VR005 YL PED
BLUE SEPARATION
Z001 (R1001 ~ R1003)
VR006 Rc/Bc SEPARATION-2
CT001 Rc/Bc SEPARATION-1
IC003
DETECT
MIX
RANSIENT IOUS RCTION
PULSE SEPA
V. EDGE AMP
+1.8V REG
TP008
CHROMA ENCODING
IC004
H. APERTURE SUPPRESS
PULSE SEPA
B-YL CLAMP
B-YL DETECTION
BFP CLAMP
BFP DETECTION
R-YL CLAMP
R-YL DETECTION
B-YL BALANCE MOLULATOR
R-YL BALANCE MODULATOR
CHROMA CLIP/ SUPPRESS
Q003 +2.5V POWER
VR008 CHROMA GAIN
Q004 PRE BL MIX
Q005 BURST GATE
Q006 PHASE SHIFTER
VR009 BURST LEVEL
CT002 BURST PHASE
Z005 (R5001~R5003)
TP006
TP007
Q012
Q013
SW001 YL ON/OFF SWITCH
CORRECTION SIGNAL GENERATOR
AUTOMATIC WHITE BALANCE SETTING
IC009
UP/DOWN COUNTER
D/A CONVERTER
COUNTER CONTROL
AWC WARNING
RESET
IC010 (a)
IC010 (b)
Q007 SYNC ON/OFF
DETECTOR
B-YL AMP
R-YL AMP
LPF
VR018 R PED
CN007
4
5
6
7

OARD (YFVPKB4850JA)

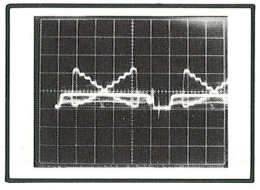
DIV, 10μs/DIV



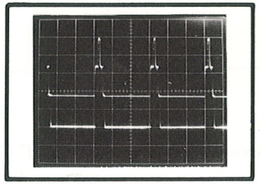
10 0.2V/DIV, 10μs/DIV



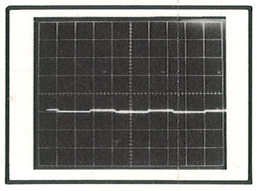
11 0.2V/DIV, 10μs/DIV



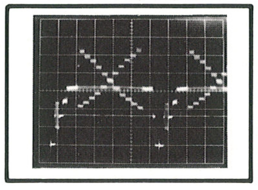
12 1V/DIV, 20μs/DIV



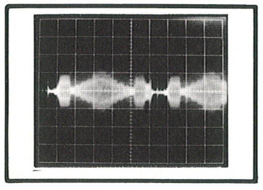
13 0.5V/DIV, 5ms/DIV



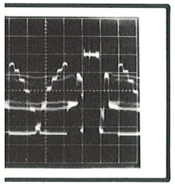
14 0.2V/DIV, 10μs/DIV



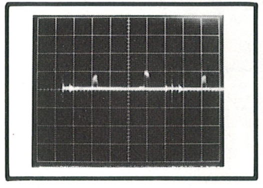
15 0.1V/DIV, 10μs/DIV



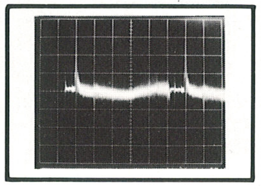
/DIV, 10μs/DIV



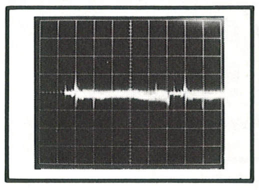
25 0.1V/DIV, 10μs/DIV



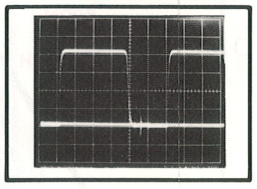
26 0.1V/DIV, 10μs/DIV



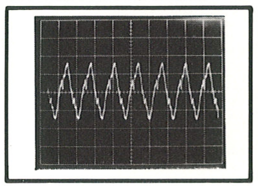
27 0.1V/DIV, 10μs/DIV



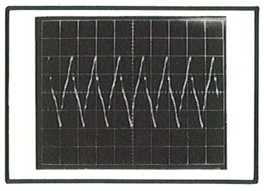
28 0.2V/DIV, 10μs/DIV

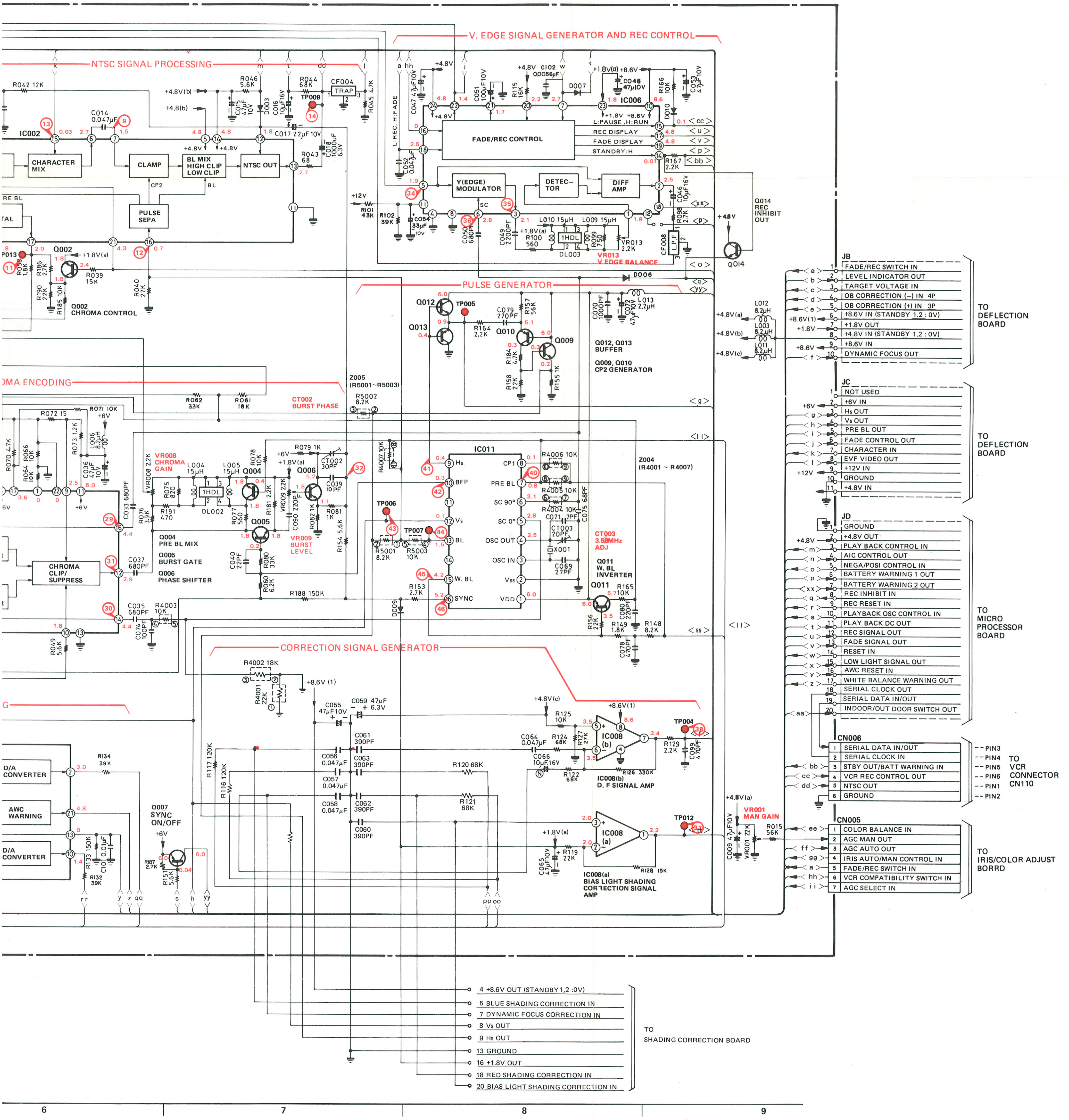


29 0.1V/DIV, 0.2μs/DIV



30 0.1V/DIV, 0.2μs/DIV





CONDUCTOR VIE

MICRO PROCESSOR BOARD

IC001	NJM3414M	B3
IC002	MN1455AVD2	B5
IC003	MN1227A	B4
IC004	MN1453AVG1	B6
IC005	MN6280	B6
Q001	2SD636-QRS	B6
Q002	2SB641-QRS	B6
Q003	2SD661-TU	B6
Q004	2SD636-QRS	B6
Q005	2SD639-QRS	B5
Q006	2SB641-QRS	B4
Q007	2SB641-QRS	B4
Q008	2SB641-QRS	B3
Q009	2SB641-QRS	B4
Q010	2SB641-QRS	B4
Q011	2SB641-QRS	B4
Q012	2SB641-QRS	B3
Q013	2SB641-QRS	B4
Q014	2SD636-QRS	B4
Q015	2SB641-QRS	B4
Q016	2SB641-QRS	B4
D001	MA165	B3
D002	MA165	B3
D003	MA165	B6
D004	MA165	B6
D005	MA165	B5
D006	MA165	B5
D007	MA165	B5
D008	MA165	B5
D009	MA165	B5
D010	MA165	B6
D011	MA165	B6
D012	MA165	B5
D013	MA165	C3
D014	MA165	C3
D017	MA165	C6

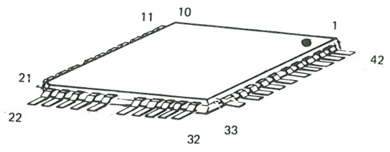
VTR REMOTE CONTROL BOARD

D001	1SS133	D5
D002	1SS133	D6
D003	1SS133	D6
D004	1SS133	D6
D005	1SS133	D5

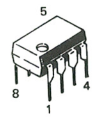
EVF DISPLAY BOARD

D001	1SS133	D3
D002	1SS133	D4
D003	1SS133	D4
D004	1SS133	D3
D005	1SS133	D3
D006	1SS133	D4
D007	1SS133	D3
D008	1SS133	D4
D009	1SS133	D4

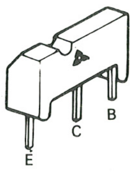
MN1455AVD2


11
10
1
42
21
22
32
33

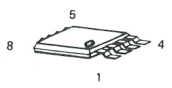
MN6280



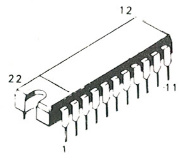
2SB641-QRS
2SD636-QRS
2SD661-TU
2SD639-QRS



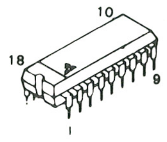
NJM3414M



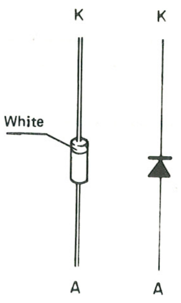
MN1227A

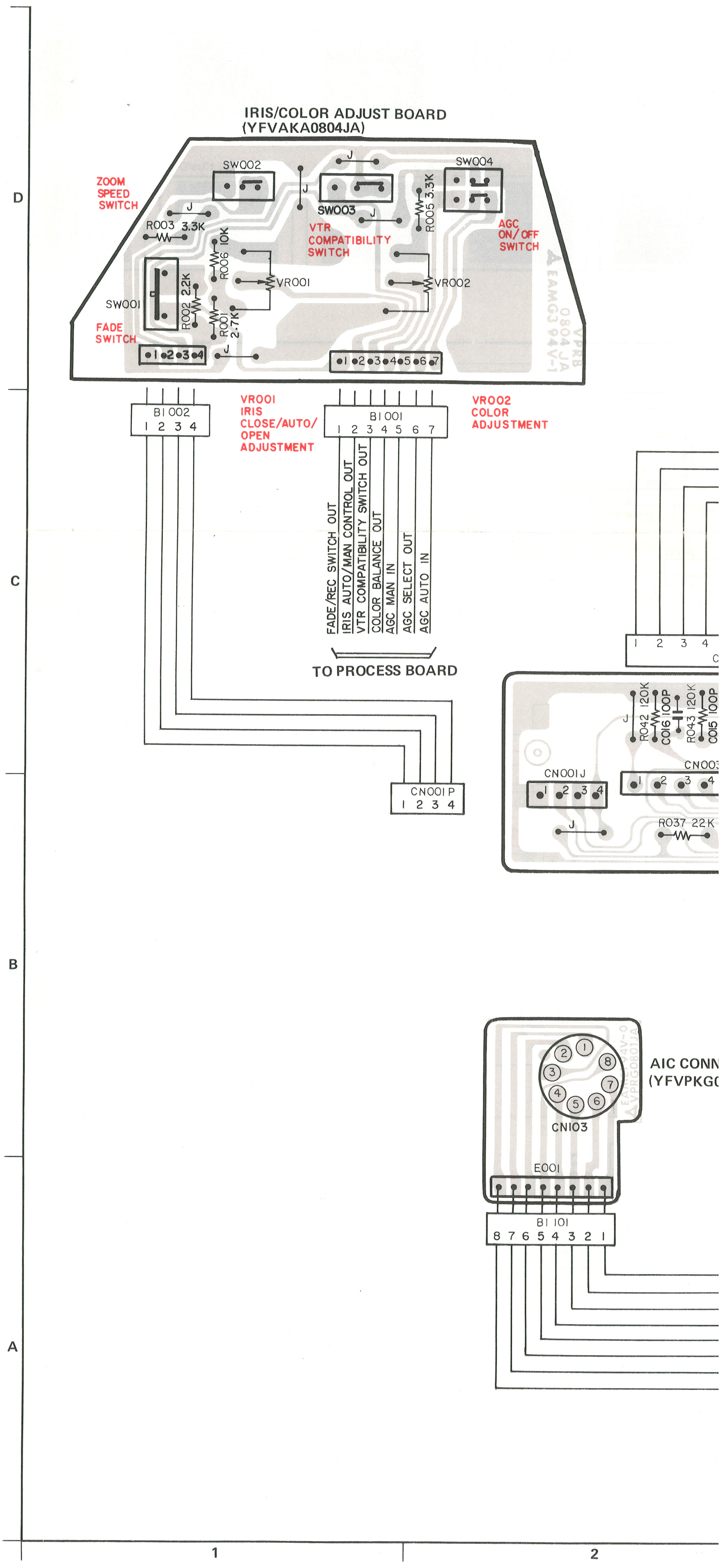


MN1453AVG1

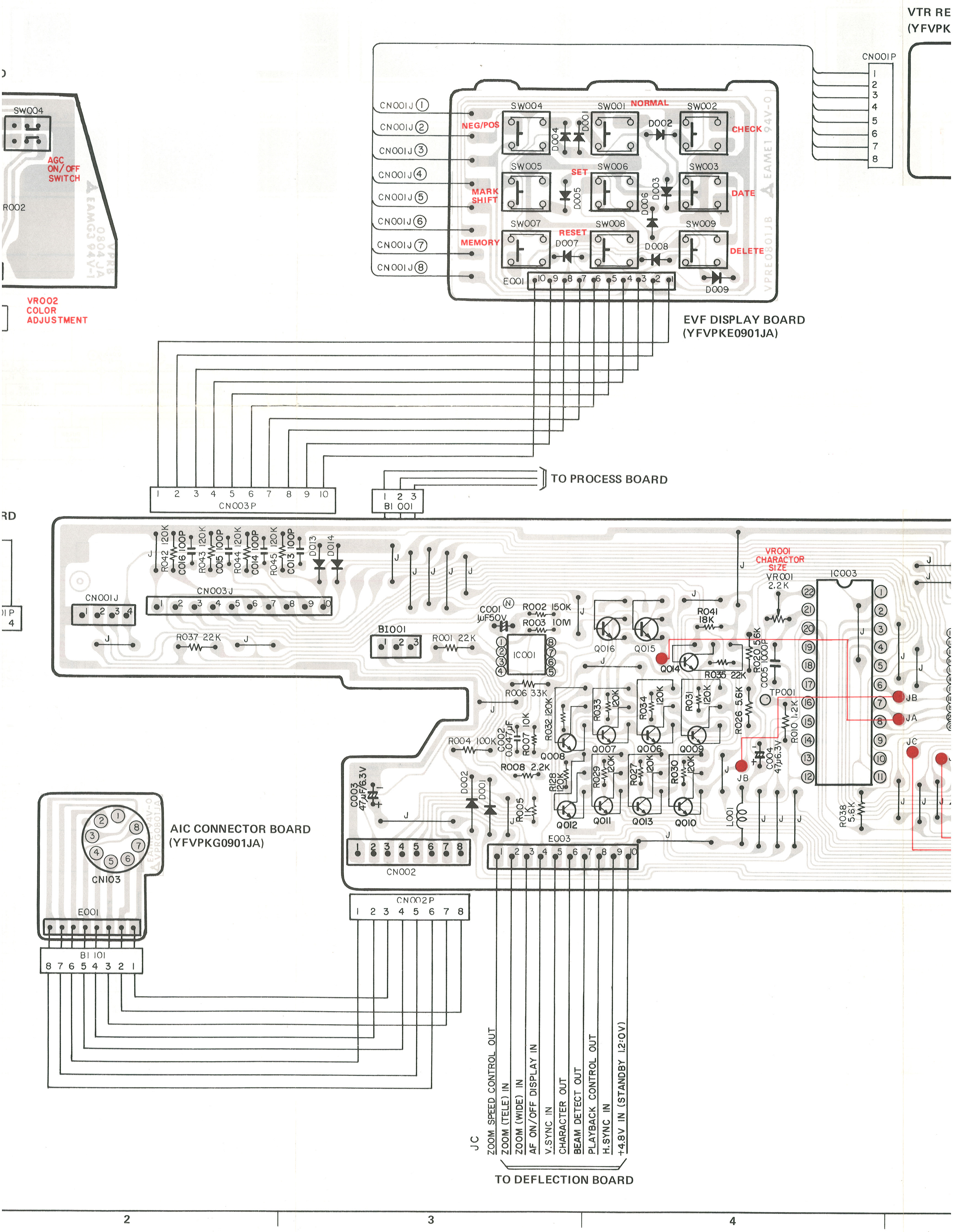


1SS133
MA165

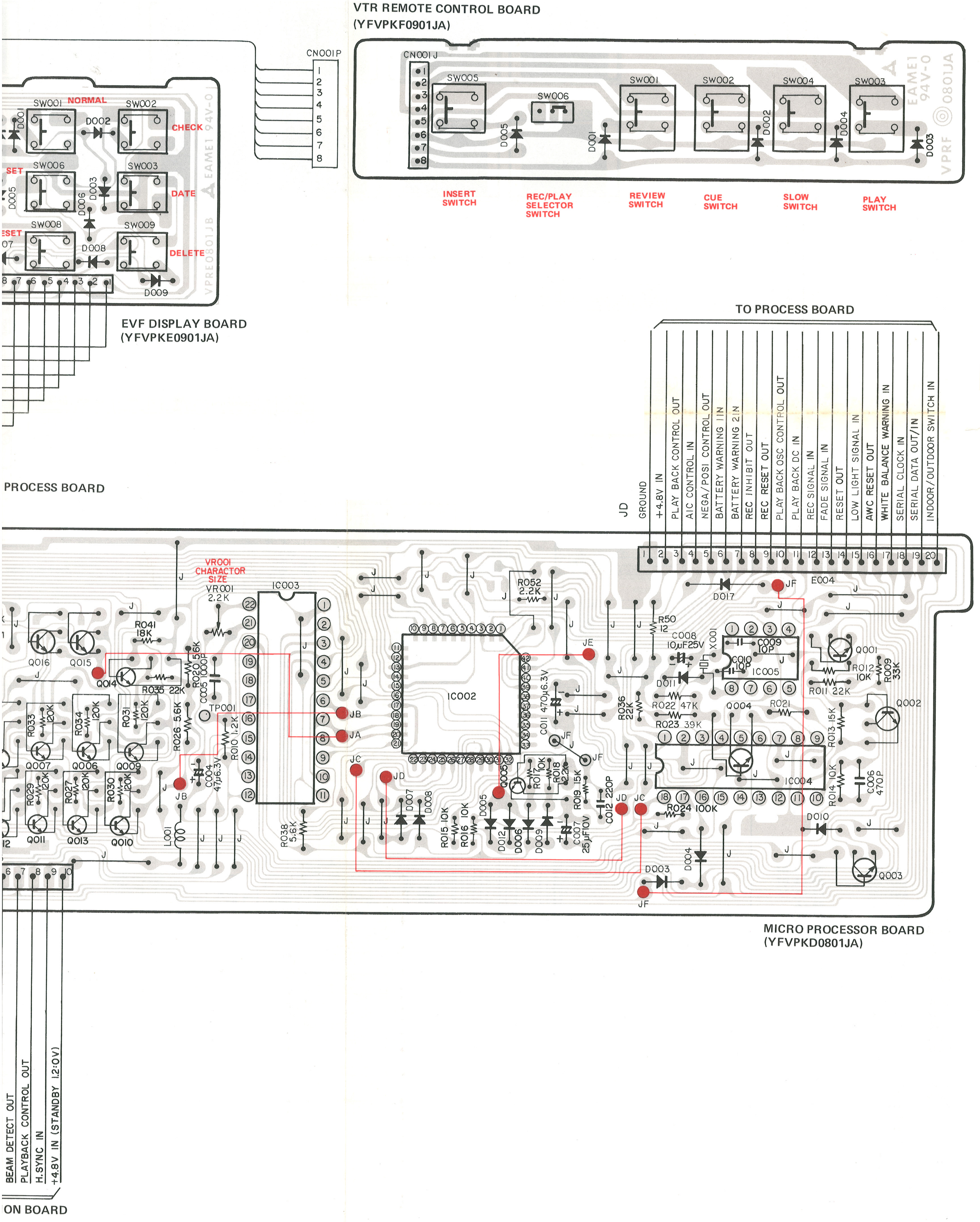



D
C
B
A
1
2
IRIS/COLOR ADJUST BOARD
(YFVAKA0804JA)
SW002
J
SW004
ZOOM SPEED SWITCH
J
SW003
J
R005 3.3K
R003 3.3K
VTR COMPATIBILITY SWITCH
AGC ON/OFF SWITCH
R006 10K
VR001
VR002
SW001
R002 2.2K
R001 2.7K
FADE SWITCH
J
1 2 3 4
1 2 3 4 5 6 7
VPRB 0804JA EAMG3 94V-1
B1002
1 2 3 4
VR001 IRIS CLOSE/AUTO/ OPEN ADJUSTMENT
B1001
1 2 3 4 5 6 7
VR002 COLOR ADJUSTMENT
FADE/REC SWITCH OUT
IRIS AUTO/MAN CONTROL OUT
VTR COMPATIBILITY SWITCH OUT
COLOR BALANCE OUT
AGC MAN IN
AGC SELECT OUT
AGC AUTO IN
TO PROCESS BOARD
CN001P
1 2 3 4
1 2 3 4
R042 120K
C016 100P
R043 120K
C015 100P
J
CN001J
1 2 3 4
CN003
1 2 3 4
J
R037 22K
AIC CONN
(YFVPKG
1 2 3 4 5 6 7 8
CN103
E001
B1101
8 7 6 5 4 3 2 1

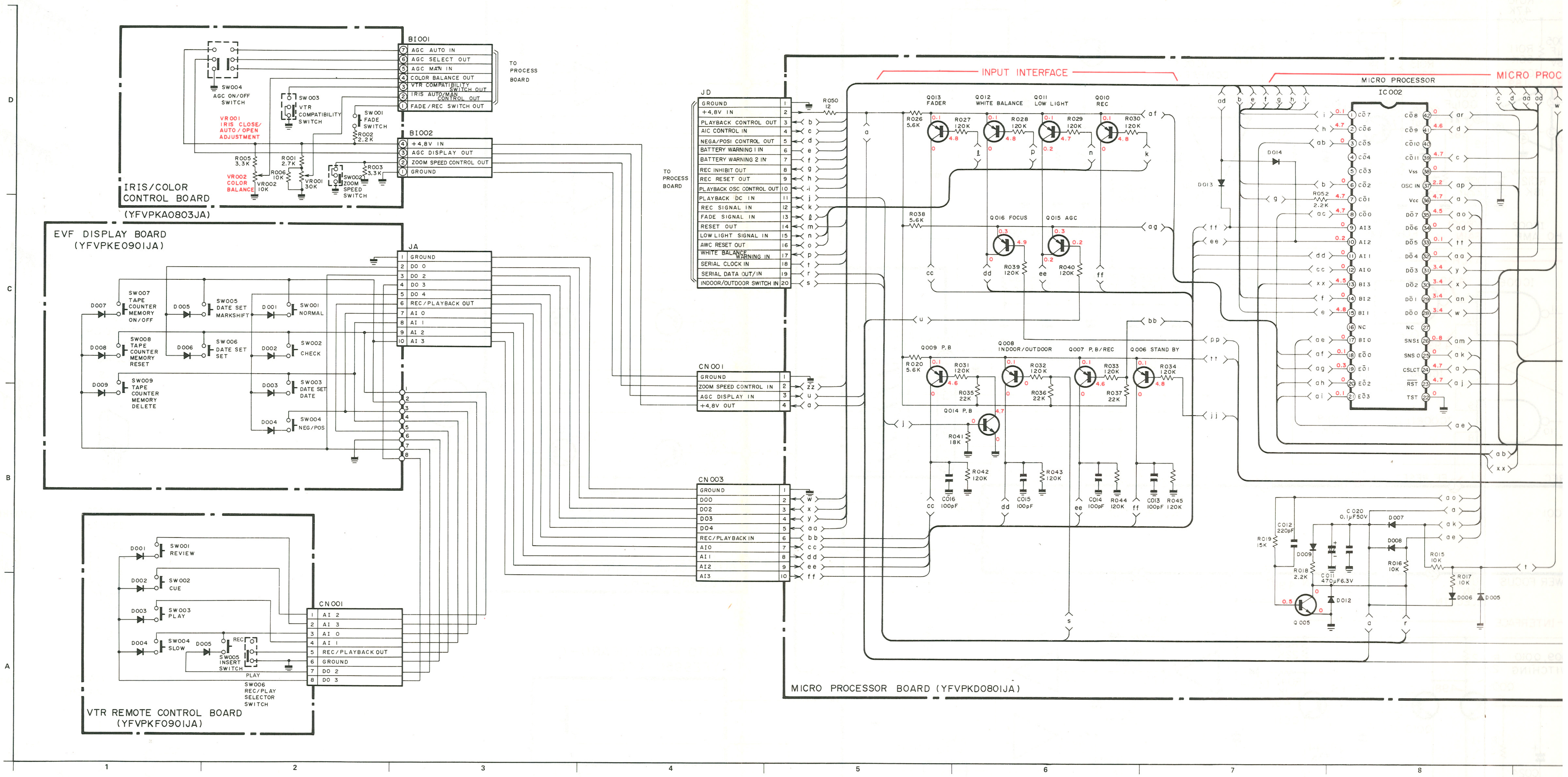
CONDUCTOR VIEW OF MICRO PROCESSOR BOARD (YFVPKC0801JA)


VTR RE
(YFVPK
CN001P
1 2 3 4 5 6 7 8
SW004
AGC ON/OFF SWITCH
R002
VR002 COLOR ADJUSTMENT
CN001J ① CN001J ② CN001J ③ CN001J ④ CN001J ⑤ CN001J ⑥ CN001J ⑦ CN001J ⑧
SW004 SW001 NORMAL SW002
NEG/POS
D004 D001 D002
CHECK
SW005 SW006 SW003
SET
MARK SHIFT
D005 D003 D006
DATE
SW007 SW008 SW009
RESET
MEMORY
D007 D008
DELETE
E001 10 9 8 7 6 5 4 3 2 1
D009
EVF DISPLAY BOARD (YFVPKE0901JA)
TO PROCESS BOARD
1 2 3 4 5 6 7 8 9 10
CN003P
1 2 3
B1 001
RD
R042 120K C016 100P R043 120K C015 100P R044 120K C014 100P R045 120K C013 100P D013 D014
CN001J
CN003J
J
R037 22K
B1001
R001 22K
C001 1µF50V
R002 150K
R003 10M
IC001
R006 33K
Q016 Q015 Q014
R041 18K
VR001 CHARACTOR SIZE
VR001 2.2K
IC003
R020 5.6K
C005 1000P
R035 22K
TP001
JB JA JC
R004 100K
C002 0.047µF
R007 10K
R032 120K
R033 120K R034 120K R031 120K
R026 5.6K
R010 1.2K
Q008 Q007 Q006 Q009
R008 2.2K
R128 120K R029 120K R027 120K R030 120K
C004 47µ6.3V
C003 47µF6.3V
D002 D001
R005 1K
Q012 Q011 Q013 Q010
L001
R038 5.6K
E003
CN002
AIC CONNECTOR BOARD (YFVPKG0901JA)
CN103
E001
B1 101
8 7 6 5 4 3 2 1
CN002P
1 2 3 4 5 6 7 8
JC
ZOOM SPEED CONTROL OUT
ZOOM (TELE) IN
ZOOM (WIDE) IN
AF ON/OFF DISPLAY IN
V.SYNC IN
CHARACTER OUT
BEAM DETECT OUT
PLAYBACK CONTROL OUT
H.SYNC IN
+4.8V IN (STANDBY 1.2:0V)
TO DEFLECTION BOARD
2 3 4

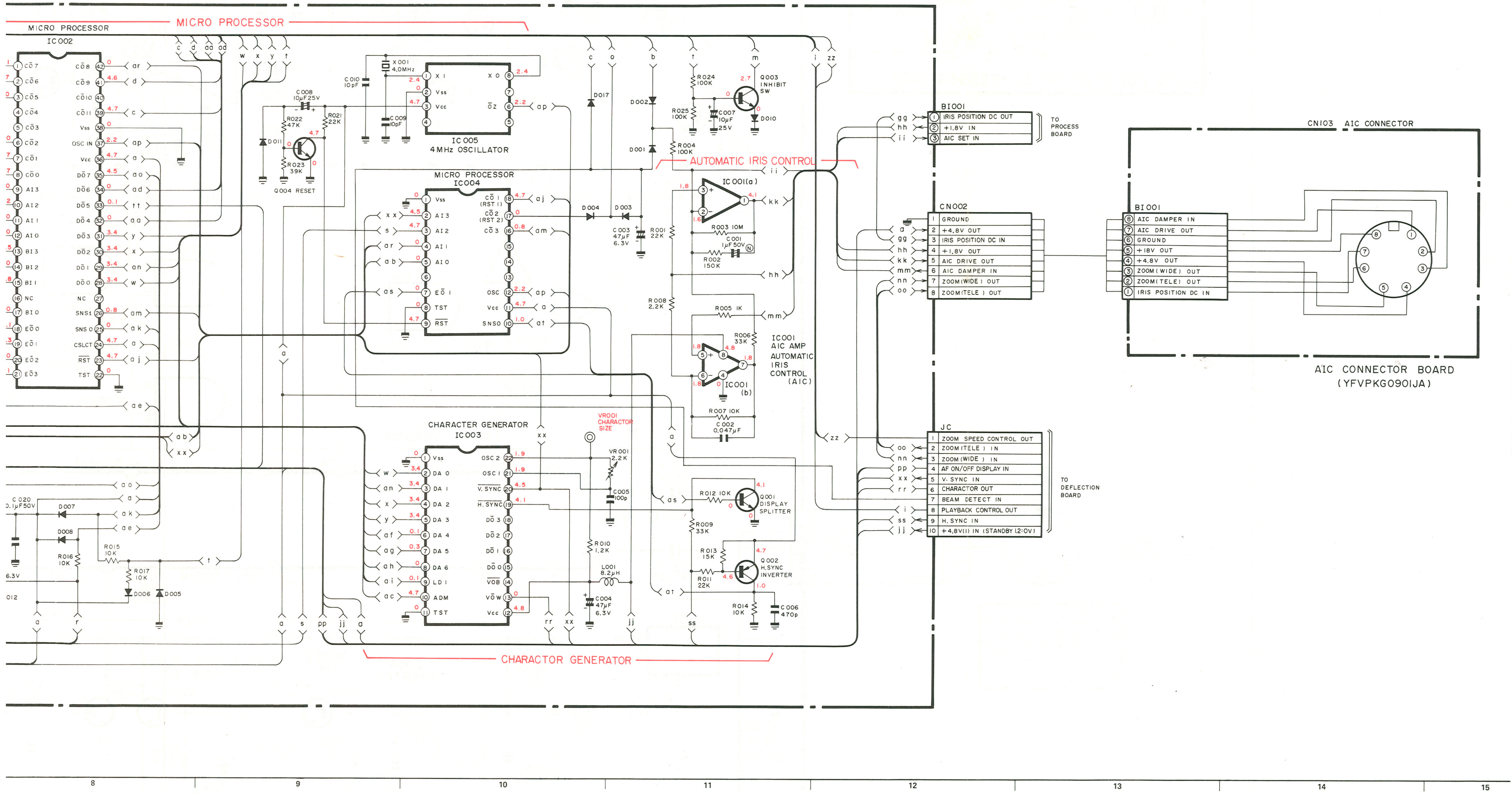
ARD (YFVPKC0801JA)


VTR REMOTE CONTROL BOARD
(YFVPKF0901JA)
CN001J
SW005
SW006
SW001
SW002
SW004
SW003
D005
D001
D002
D004
D003
EAME1 94V-0
0801JA
VPRF
INSERT SWITCH
REC/PLAY SELECTOR SWITCH
REVIEW SWITCH
CUE SWITCH
SLOW SWITCH
PLAY SWITCH
CN001P
1
2
3
4
5
6
7
8
SW001 NORMAL
SW002
CHECK
D002
SET
SW006
SW003
DATE
D003
D006
D005
ESET
SW008
SW009
D008
DELETE
D009
EAME1 94V-0
VPRE0801JB
EVF DISPLAY BOARD
(YFVPKE0901JA)
PROCESS BOARD
TO PROCESS BOARD
JD
GROUND
+4.8V IN
PLAY BACK CONTROL OUT
AIC CONTROL IN
NEGA/POSI CONTROL OUT
BATTERY WARNING 1 IN
BATTERY WARNING 2 IN
REC INHIBIT OUT
REC RESET OUT
PLAY BACK OSC CONTROL OUT
PLAY BACK DC IN
REC SIGNAL IN
FADE SIGNAL IN
RESET OUT
LOW LIGHT SIGNAL IN
AWC RESET OUT
WHITE BALANCE WARNING IN
SERIAL CLOCK IN
SERIAL DATA OUT/IN
INDOOR/OUTDOOR SWITCH IN
VR001 CHARACTOR SIZE
VR001 2.2K
IC003
R041 18K
Q016
Q015
Q014
R035 22K
R020 5.6K
C005 1000P
TP001
R033 120K
R034 120K
R031 120K
R026 5.6K
R010 1.2K
Q007
Q006
Q009
C004 47μ6.3V
JB
R029 120K
R027 120K
R030 120K
Q011
Q013
Q010
L001
R038 5.6K
JA
JC
JD
JE
JF
R052 2.2K
IC002
C011 470μ6.3V
Q005
R017 10K
R018 22K
R019 15K
C012 220P
C007 25μF10V
D007
D008
R015 10K
R016 10K
D005
D012
D006
D009
D017
E004
R50 12
C008 10μF25V
X001
C009 10P
C010 10P
IC005
D011
R022 47K
R023 39K
R036 22K
Q004
R021
IC004
R024 100K
Q001
R012 10K
R009 33K
R011 22K
Q002
R013 15K
R014 10K
C006 470P
D010
D004
D003
Q003
MICRO PROCESSOR BOARD
(YFVPKD0801JA)
BEAM DETECT OUT
PLAYBACK CONTROL OUT
H.SYNC IN
+4.8V IN (STANDBY 1.2:0V)
ON BOARD
4
5
6

SCHEMATIC DIAGRAM OF MICRO PROCESS


IRIS/COLOR CONTROL BOARD
(YFVPKA0803JA)
SW004 AGC ON/OFF SWITCH
SW003 VTR COMPATIBILITY SWITCH
SW001 FADE SWITCH
SW002 ZOOM SPEED SWITCH
VR001 IRIS CLOSE/AUTO/OPEN ADJUSTMENT
VR002 COLOR BALANCE
R005 3.3K
R001 2.7K
R006 10K
R002 2.2K
R003 3.3K
VR001 30K
VR002 10K
B1001
7 AGC AUTO IN
6 AGC SELECT OUT
5 AGC MAN IN
4 COLOR BALANCE OUT
3 VTR COMPATIBILITY SWITCH OUT
2 IRIS AUTO/MAN CONTROL OUT
1 FADE/REC SWITCH OUT
TO PROCESS BOARD
B1002
4 +4.8V IN
3 AGC DISPLAY OUT
2 ZOOM SPEED CONTROL OUT
1 GROUND
EVF DISPLAY BOARD
(YFVPKE0901JA)
SW007 TAPE COUNTER MEMORY ON/OFF
SW005 DATE SET MARKSHIFT
SW001 NORMAL
SW008 TAPE COUNTER MEMORY RESET
SW006 DATE SET SET
SW002 CHECK
SW009 TAPE COUNTER MEMORY DELETE
SW003 DATE SET DATE
SW004 NEG/POS
D001 D002 D003 D004 D005 D006 D007 D008 D009
JA
1 GROUND
2 DO 0
3 DO 2
4 DO 3
5 DO 4
6 REC/PLAYBACK OUT
7 AI 0
8 AI 1
9 AI 2
10 AI 3
VTR REMOTE CONTROL BOARD
(YFVPKF0901JA)
SW001 REVIEW
SW002 CUE
SW003 PLAY
SW004 SLOW
SW005 INSERT SWITCH
REC
PLAY
SW006 REC/PLAY SELECTOR SWITCH
CN001
1 AI 2
2 AI 3
3 AI 0
4 AI 1
5 REC/PLAYBACK OUT
6 GROUND
7 DO 2
8 DO 3
TO PROCESS BOARD
JD
GROUND 1
+4.8V IN 2
PLAYBACK CONTROL OUT 3
AIC CONTROL IN 4
NEGA/POSI CONTROL OUT 5
BATTERY WARNING 1 IN 6
BATTERY WARNING 2 IN 7
REC INHIBIT OUT 8
REC RESET OUT 9
PLAYBACK OSC CONTROL OUT 10
PLAYBACK DC IN 11
REC SIGNAL IN 12
FADE SIGNAL IN 13
RESET OUT 14
LOW LIGHT SIGNAL IN 15
AWC RESET OUT 16
WHITE BALANCE WARNING IN 17
SERIAL CLOCK IN 18
SERIAL DATA OUT/IN 19
INDOOR/OUTDOOR SWITCH IN 20
CN001
GROUND 1
ZOOM SPEED CONTROL IN 2
AGC DISPLAY IN 3
+4.8V OUT 4
CN003
GROUND 1
DO0 2
DO2 3
DO3 4
DO4 5
REC/PLAYBACK IN 6
AI0 7
AI1 8
AI2 9
AI3 10
INPUT INTERFACE
R050 12
Q013 FADER
Q012 WHITE BALANCE
Q011 LOW LIGHT
Q010 REC
R026 5.6K
R027 120K
R028 120K
R029 120K
R030 120K
Q016 FOCUS
Q015 AGC
R038 5.6K
R039 120K
R040 120K
Q009 P.B
Q008 INDOOR/OUTDOOR
Q007 P.B/REC
Q006 STAND BY
R020 5.6K
R031 120K
R032 120K
R033 120K
R034 120K
R035 22K
R036 22K
R037 22K
Q014 P.B
R041 18K
R042 120K
R043 120K
C016 100pF
C015 100pF
C014 100pF
R044 120K
C013 100pF
R045 120K
MICRO PROCESSOR
MICRO PROC
IC002
D013
D014
R052 2.2K
C̄O7 C̄O6 C̄O5 C̄O4 C̄O3 C̄O2 C̄O1 C̄O0
AI3 AI2 AI1 AI0
BI3 BI2 BI1 NC BI0
ĒO0 ĒO1 ĒO2 ĒO3
C̄O8 C̄O9 C̄O10 C̄O11
Vss OSC IN Vcc
D̄O7 D̄O6 D̄O5 D̄O4 D̄O3 D̄O2 D̄O1 D̄O0
NC SNS1 SNS0 CSLCT RST TST
C012 220pF
C020 0.1μF50V
R019 15K
D009
R018 2.2K
C011 470μF6.3V
D007
D008
R016 10K
R015 10K
R017 10K
D006 D005
D012
Q005
MICRO PROCESSOR BOARD (YFVPKD0801JA)
1 2 3 4 5 6 7 8
D C B A

F MICRO PROCESSOR BOARD (YFVPKC0801JA)


MICRO PROCESSOR
IC002
MICRO PROCESSOR
IC005
4MHz OSCILLATOR
X001 4.0MHz
Q003 INHIBIT SW
Q004 RESET
MICRO PROCESSOR
IC004
AUTOMATIC IRIS CONTROL
IC001(a)
IC001 AIC AMP
AUTOMATIC IRIS CONTROL (AIC)
IC001(b)
CHARACTER GENERATOR
IC003
VR001 CHARACTOR SIZE
Q001 DISPLAY SPLITTER
Q002 H.SYNC INVERTER
CHARACTOR GENERATOR
BI001
① IRIS POSITION DC OUT
② +1.8V IN
③ AIC SET IN
TO PROCESS BOARD
CN002
1 GROUND
2 +4.8V OUT
3 IRIS POSITION DC IN
4 +1.8V OUT
5 AIC DRIVE OUT
6 AIC DAMPER IN
7 ZOOM (WIDE) OUT
8 ZOOM (TELE) OUT
JC
1 ZOOM SPEED CONTROL OUT
2 ZOOM (TELE) IN
3 ZOOM (WIDE) IN
4 AF ON/OFF DISPLAY IN
5 V. SYNC IN
6 CHARACTOR OUT
7 BEAM DETECT IN
8 PLAYBACK CONTROL OUT
9 H. SYNC IN
10 +4.8V(1) IN (STANDBY (2:0V)
TO DEFLECTION BOARD
CN103 AIC CONNECTOR
BI001
⑧ AIC DAMPER IN
⑦ AIC DRIVE OUT
⑥ GROUND
⑤ +18V OUT
④ +4.8V OUT
③ ZOOM (WIDE) OUT
② ZOOM (TELE) OUT
① IRIS POSITION DC IN
AIC CONNECTOR BOARD
(YFVPKG0901JA)
8
9
10
11
12
13
14
15

MICRO PROCESSOR BOARD

IC001	NJM3414M	C11, B11
IC002	MN1455AVD2	D8, C8
IC003	MN1227A	B10, A10
IC004	MN1453AVG1	C10
IC005	MN6280	D10
Q001	2SD636-QRS	B11
Q002	2SB641-QRS	A11
Q003	2SD661-TU	D11
Q004	2SD636-QRS	C9
Q005	2SD639-QRS	A7
Q006	2SB641-QRS	C7
Q007	2SB641-QRS	C6
Q008	2SB641-QRS	C6
Q009	2SB641-QRS	C5
Q010	2SB641-QRS	D6
Q011	2SB641-QRS	D6
Q012	2SB641-QRS	D6
Q013	2SB641-QRS	D5
Q014	2SD636-QRS	B6
Q015	2SB641-QRS	C6
Q016	2SB641-QRS	C6
D001	MA165	C11
D002	MA165	D11
D003	MA165	C11
D004	MA165	C10
D005	MA165	A8
D006	MA165	A8
D007	MA165	B8
D008	MA165	B8
D009	MA165	B7
D010	MA165	D11
D011	MA165	D9
D012	MA165	A8
D013	MA165	D7
D014	MA165	D7
D017	MA165	D10

VTR REMOTE CONTROL BOARD

D001	1SS133	B1
D002	1SS133	A1
D003	1SS133	A1
D004	1SS133	A1
D005	1SS133	A2

EVF DISPLAY BOARD

D001	1SS133	C2
D002	1SS133	C2
D003	1SS133	B2
D004	1SS133	B2
D005	1SS133	C1
D006	1SS133	C1
D007	1SS133	C1
D008	1SS133	C1
D009	1SS133	B1

AUTO FOCUS BOARD-A

IC001	YFSS514-49	B3, B4, B5
IC002	TA7120P	D4
IC003	AN6914	D5
IC004	NJM78L05A	D6
IC005	UPD4069UBC	C2, C3, A5
IC006	UPD4011BC	C3, C4
IC007	NJM78L05A	B2, A2
Q001	2SC2603 (or 2SC2458)	D2
Q002	2SA1115 (or 2SA1048)	D2
Q003	2SD966	D2
Q004	2SC1317	D3
Q005	2SD966	D3
Q006	2SC2603 (or 2SC2458)	D4
Q007	2SC2603	D5
Q008	2SC2603	A3
Q009	2SC2603	A4
Q010	2SC2603 (or 2SC2458)	A4
Q011	2SC2603	A4
D001	YWRA-1Z	D2
D002	MA1047	D2
D003	MA1091	D2
D004	YWRA-1Z	D3
D005	YWRA-1Z	D3
D006	YWRA-1Z	D3
D007	YWRA-1Z	D3
D008	MA1047	D4
D009	MA150	A5
D010	MA150	B5

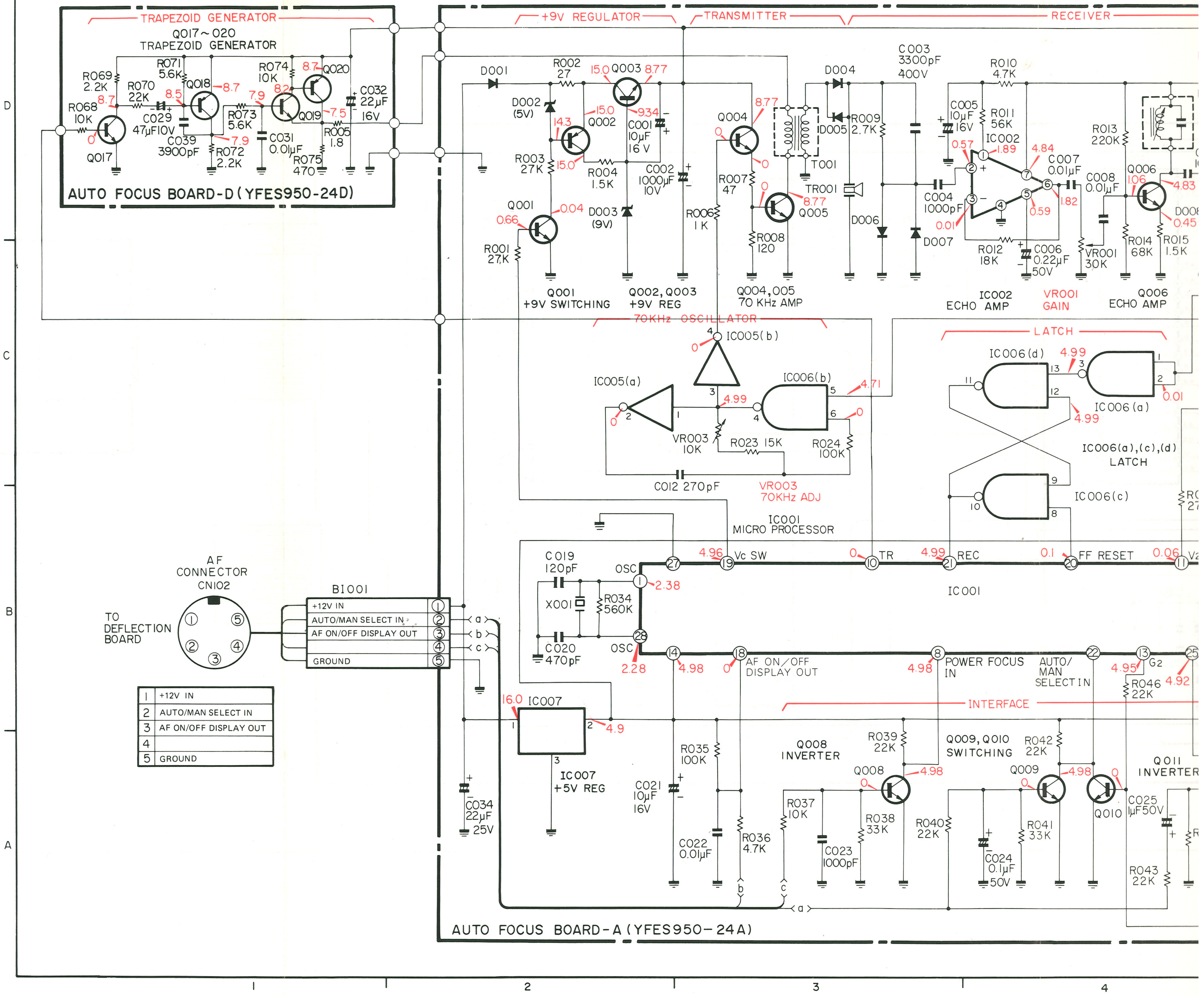
AUTO FOCUS BOARD-B

IC008	AN6914	D7, C7
Q012	2SA720-QR	C7
Q013	2SD965-QR	B7
Q015	2SA720-QR	C7
Q016	2SD965-QR	B7

AUTO FOCUS BOARD-D

Q017	2SC2458	D1
Q018	2SA1048	D1
Q019	2SC2458	D1
Q020	2SB873	D1

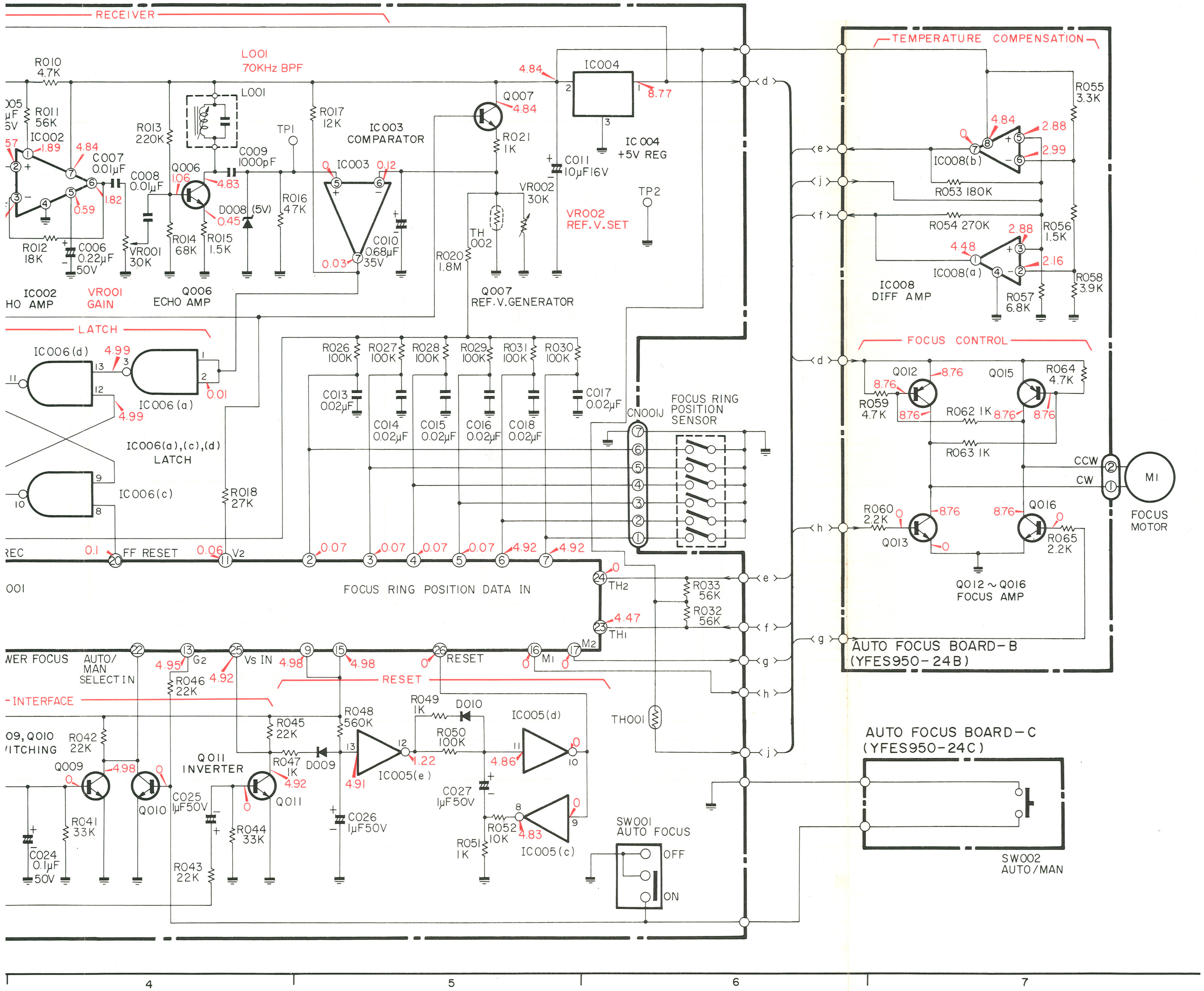
SCHEMATIC DIAGRAM OF AOTO FOCUS BOARD (YFES950—24A, YFE

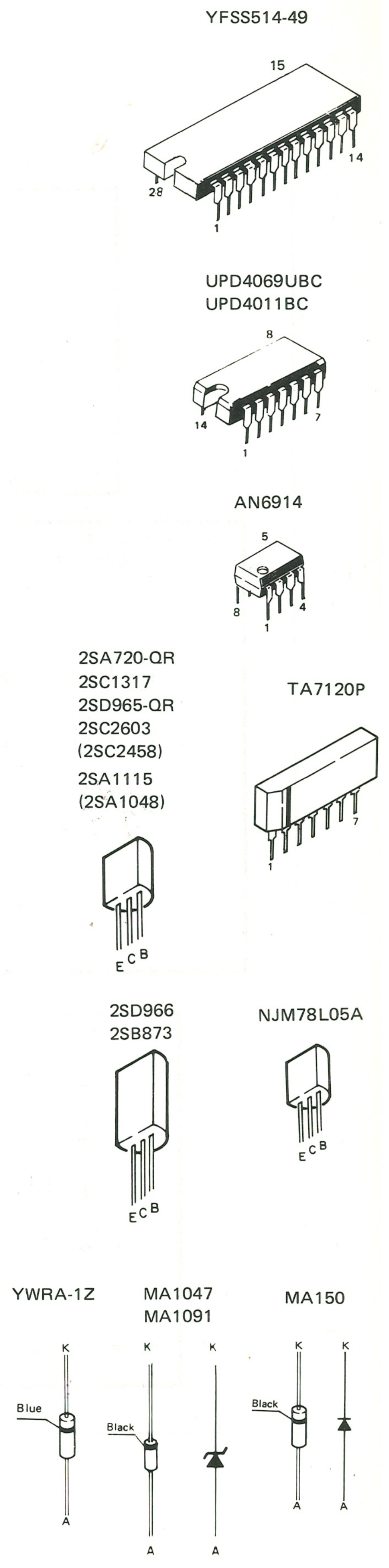


TRAPEZOID GENERATOR
Q017~020
TRAPEZOID GENERATOR
R069 2.2K
R068 10K
R070 22K
R071 5.6K
R072 2.2K
R073 5.6K
R074 10K
R075 470
R005 1.8
C029 47μF10V
C039 3900pF
C031 0.01μF
C032 22μF 16V
Q017
Q018
Q019
Q020
8.7
8.5
8.7
7.9
8.2
8.7
7.5
7.9
0
AUTO FOCUS BOARD-D (YFES950-24D)
+9V REGULATOR
TRANSMITTER
RECEIVER
D001
D002 (5V)
D003 (9V)
D004
D005
D006
D007
R001 27K
R002 27
R003 27K
R004 1.5K
R006 1K
R007 47
R008 120
R009 2.7K
R010 4.7K
R011 56K
R012 18K
R013 220K
R014 68K
R015 1.5K
C001 10μF 16V
C002 1000μF 10V
C003 3300pF 400V
C004 1000pF
C005 10μF 16V
C006 0.22μF 50V
C007 0.01μF
C008 0.01μF
T001
TR001
VR001 30K
IC002
Q001
Q002
Q003
Q004
Q005
Q006
15.0
8.77
14.3
15.0
9.34
15.0
0.66
0.04
8.77
0
0
0
8.77
0.57
1.89
4.84
0.01
0.59
1.82
1.06
4.83
0.45
Q001 +9V SWITCHING
Q002,Q003 +9V REG
Q004,005 70 KHz AMP
IC002 ECHO AMP
VR001 GAIN
Q006 ECHO AMP
70KHz OSCILLATOR
IC005(b)
IC005(a)
IC006(b)
VR003 10K
R023 15K
R024 100K
C012 270pF
VR003 70KHz ADJ
0
0
4.99
4.71
0
LATCH
IC006(d)
IC006(a)
IC006(c)
IC006(a),(c),(d) LATCH
4.99
0.01
4.99
IC001 MICRO PROCESSOR
AF CONNECTOR CN102
TO DEFLECTION BOARD
B1001
+12V IN
AUTO/MAN SELECT IN
AF ON/OFF DISPLAY OUT
GROUND
C019 120pF
X001
R034 560K
C020 470pF
OSC
OSC
2.38
2.28
4.96
Vc SW
0
TR
4.99
REC
0.1
FF RESET
0.06
IC001
4.98
0
AF ON/OFF DISPLAY OUT
4.98
POWER FOCUS IN
AUTO/MAN SELECT IN
4.95
G2
R046 22K
4.92
16.0
IC007
4.9
IC007 +5V REG
C034 22μF 25V
C021 10μF 16V
C022 0.01μF
R035 100K
R036 4.7K
R037 10K
C023 1000pF
R038 33K
R039 22K
R040 22K
R041 33K
R042 22K
R043 22K
C024 0.1μF 50V
C025 1μF50V
INTERFACE
Q008 INVERTER
Q009,Q010 SWITCHING
Q011 INVERTER
Q008
Q009
Q010
4.98
4.98
0
0
0
AUTO FOCUS BOARD-A (YFES950-24A)
D
C
B
A
1
2
3
4

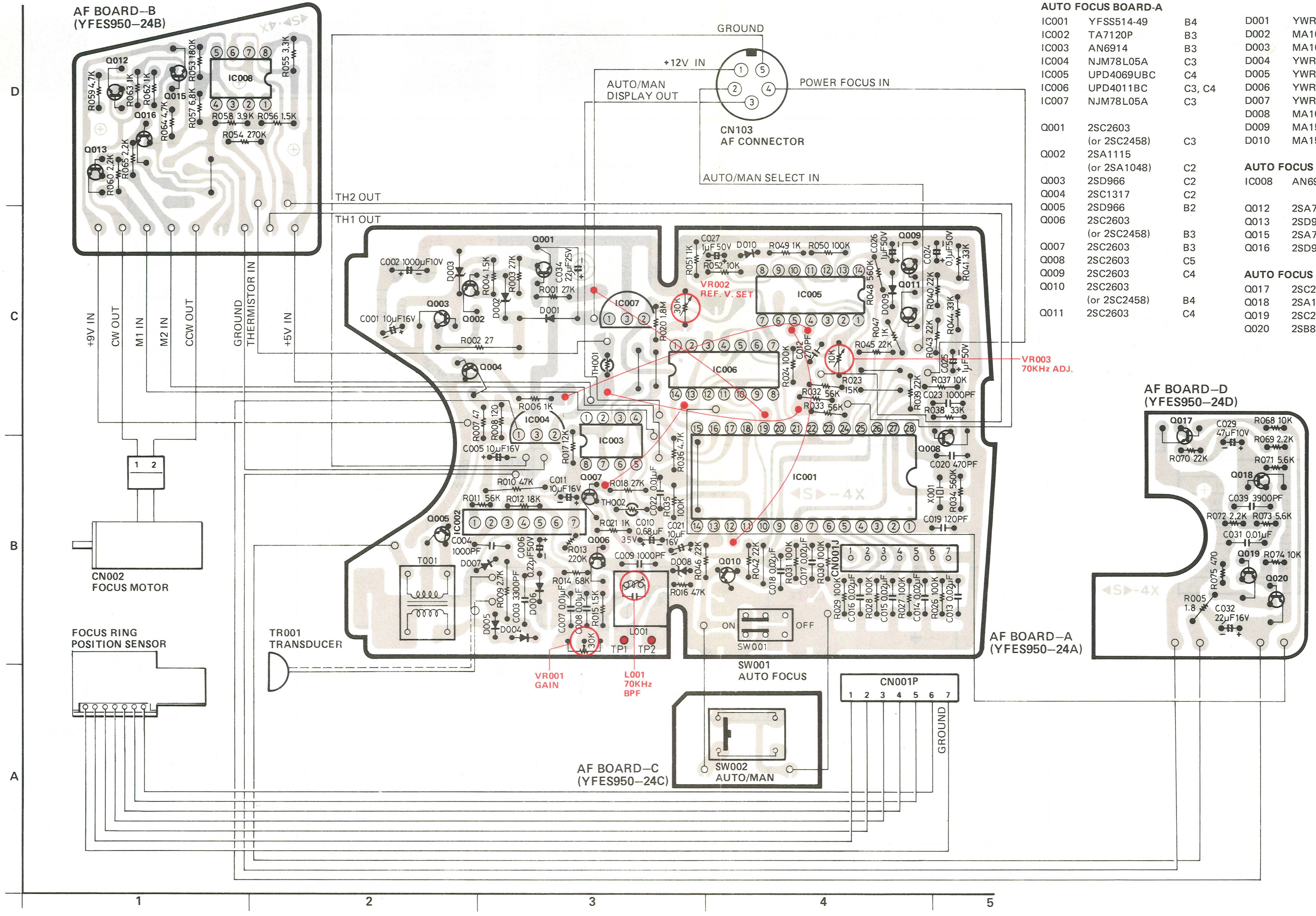
1	+12V IN
2	AUTO/MAN SELECT IN
3	AF ON/OFF DISPLAY OUT
4	
5	GROUND

D (YFES950—24A, YFES950—24B, YFES950—24C, YFES950—24D)


RECEIVER
R010 4.7K
R011 56K
IC002
C007 0.01μF
C008 0.01μF
R012 18K
C006 0.22μF 50V
VR001 30K
IC002 ECHO AMP
VR001 GAIN
L001 70KHz BPF
L001
R013 220K
Q006
R014 68K
R015 1.5K
D008 (5V)
C009 1000pF
TP1
R016 47K
R017 12K
IC003 COMPARATOR
IC003
C010 .068μF 35V
Q006 ECHO AMP
Q007
R021 1K
VR002 30K
TH 002
R020 1.8M
Q007 REF.V.GENERATOR
IC004
IC 004 +5V REG
C011 10μF16V
VR002 REF.V.SET
TP2
4.84
8.77
LATCH
IC006(d)
IC006(a)
IC006(a),(c),(d) LATCH
IC006(c)
R018 27K
R026 100K
R027 100K
R028 100K
R029 100K
R031 100K
R030 100K
C013 .002μF
C014 0.02μF
C015 0.02μF
C016 0.02μF
C018 0.02μF
C017 0.02μF
CN001J
FOCUS RING POSITION SENSOR
REC
FF RESET
V2
FOCUS RING POSITION DATA IN
TH2
TH1
R033 56K
R032 56K
POWER FOCUS
AUTO/MAN SELECTIN
G2
Vs IN
RESET
M1
M2
R046 22K
INTERFACE
Q009, Q010 SWITCHING
R042 22K
Q009
Q010
R041 33K
C024 0.1μF 50V
C025 1μF50V
R043 22K
Q011 INVERTER
Q011
R044 33K
R045 22K
R047 1K
D009
R048 560K
C026 1μF50V
IC005(e)
R049 1K
D010
R050 100K
IC005(d)
C027 1μF50V
R052 10K
R051 1K
IC005(c)
TH001
SW001 AUTO FOCUS
OFF
ON
TEMPERATURE COMPENSATION
R055 3.3K
IC008(b)
R053 180K
R054 270K
R056 1.5K
IC008(a)
IC008 DIFF AMP
R057 6.8K
R058 3.9K
FOCUS CONTROL
Q012
Q015
R064 4.7K
R059 4.7K
R062 1K
R063 1K
CCW
CW
M1
FOCUS MOTOR
R060 2.2K
Q013
Q016
R065 2.2K
Q012 ~ Q016 FOCUS AMP
AUTO FOCUS BOARD-B (YFES950-24B)
AUTO FOCUS BOARD-C (YFES950-24C)
SW002 AUTO/MAN
4
5
6
7


YFSS514-49
15
14
28
1
UPD4069UBC
UPD4011BC
8
14
7
1
AN6914
5
8
4
1
2SA720-QR
2SC1317
2SD965-QR
2SC2603
(2SC2458)
2SA1115
(2SA1048)
E C B
TA7120P
1
7
2SD966
2SB873
E C B
NJM78L05A
E C B
YWRA-1Z
MA1047
MA1091
MA150
K
A
Blue
Black
Black

CONDUCTOR VIEW OF AUTO FOCUS BOARD (YFES950–24A, YFES950–24B, YFES950–24C, YFES950–24D)


AF BOARD–B
(YFES950–24B)
Q012
Q013
Q015
Q016
IC008
R059 4.7K
R063 1K
R062 1K
R053 180K
R055 3.3K
R057 6.8K
R058 3.9K
R056 1.5K
R054 270K
R064 4.7K
R061 2.2K
R060 2.2K
GROUND
+12V IN
AUTO/MAN
DISPLAY OUT
POWER FOCUS IN
CN103
AF CONNECTOR
AUTO/MAN SELECT IN
TH2 OUT
TH1 OUT
+9V IN
CW OUT
M1 IN
M2 IN
CCW OUT
GROUND
THERMISTOR IN
+5V IN
Q001
C002 1000μF10V
C001 10μF16V
Q003
Q002
Q004
D003
D002
D001
R004 1.5K
R003 27K
R001 27K
C034 22μF25V
R002 27
IC007
R020 1.8M
TH001
C027 1μF50V
D010
R049 1K
R050 100K
R051 1K
R052 10K
VR002
REF. V. SET
IC005
C026 1μF50V
Q009
C024 0.1μF50V
R041 33K
R048 560K
D009
Q011
R040 22K
R044 33K
R047 1K
R043 22K
R045 22K
C025 1μF50V
VR003
70KHz ADJ.
IC006
R024 100K
C012 470PF
R023 15K
R037 10K
R039 22K
R032 56K
R033 56K
C023 1000PF
R038 33K
R006 1K
R007 47
R008 120
IC004
R017 12K
IC003
R036 4.7K
C005 10μF16V
Q008
C020 470PF
R010 47K
C011 10μF16V
Q007
R018 27K
IC001
X001
R034 560K
R011 56K
R012 18K
TH002
C022 0.01μF
R035 100K
Q005
IC002
R021 1K
C010 0.68μF 35V
C021 10μF 16V
C019 120PF
C004 1000PF
Q006
R013 220K
C009 1000PF
D008
R046 22K
Q010
R042 22K
C018 0.02μF
R031 100K
C017 0.02μF
R030 100K
CN001J
T001
D007
C006 0.22μF50V
C003 3300PF
R009 2.7K
D006
D005
D004
R014 68K
C007 0.01μF
C008 0.01μF
R015 1.5K
R016 47K
R029 100K
C016 0.02μF
R028 100K
C015 0.02μF
R027 100K
C014 0.02μF
R026 100K
C013 0.02μF
30K
L001
TP1
TP2
ON
OFF
SW001
VR001
GAIN
L001
70KHz
BPF
SW001
AUTO FOCUS
AF BOARD–A
(YFES950–24A)
1 2
CN002
FOCUS MOTOR
FOCUS RING
POSITION SENSOR
TR001
TRANSDUCER
AF BOARD–C
(YFES950–24C)
SW002
AUTO/MAN
CN001P
1 2 3 4 5 6 7
GROUND
AF BOARD–D
(YFES950–24D)
Q017
Q018
Q019
Q020
C029 47μF10V
R068 10K
R069 2.2K
R070 22K
R071 5.6K
C039 3900PF
R072 2.2K
R073 5.6K
C031 0.01μF
R074 10K
R075 470
R005 1.8
C032 22μF16V
D
C
B
A
1
2
3
4
5

AUTO FOCUS BOARD-A

IC001	YFSS514-49	B4
IC002	TA7120P	B3
IC003	AN6914	B3
IC004	NJM78L05A	C3
IC005	UPD4069UBC	C4
IC006	UPD4011BC	C3, C4
IC007	NJM78L05A	C3
Q001	2SC2603 (or 2SC2458)	C3
Q002	2SA1115 (or 2SA1048)	C2
Q003	2SD966	C2
Q004	2SC1317	C2
Q005	2SD966	B2
Q006	2SC2603 (or 2SC2458)	B3
Q007	2SC2603	B3
Q008	2SC2603	C5
Q009	2SC2603	C4
Q010	2SC2603 (or 2SC2458)	B4
Q011	2SC2603	C4
D001	YWRA-1Z	C3
D002	MA1047	C3
D003	MA1091	C2
D004	YWRA-1Z	B3
D005	YWRA-1Z	B3
D006	YWRA-1Z	B3
D007	YWRA-1Z	B3
D008	MA1047	B3
D009	MA150	C4
D010	MA150	C4

AUTO FOCUS BOARD-B

IC008	AN6914	D1
Q012	2SA720-QR	D1
Q013	2SD965-QR	D1
Q015	2SA720-QR	D1
Q016	2SD965-QR	D1

AUTO FOCUS BOARD-D

Q017	2SC2458	C6
Q018	2SA1048	B6
Q019	2SC2458	B6
Q020	2SB873	B6

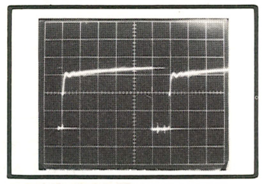
SCHEMATIC DIAGRAM OF ELECTRONIC VIEWFINDER BOARD (YFVPKA0803JA)

Q001	2SD975	D3
Q002	2SB642-QRS	B4
Q003	2SA564-QRS	C3
D001	MA165	C3
D002	MA162	C4
D003	ES01F	D4

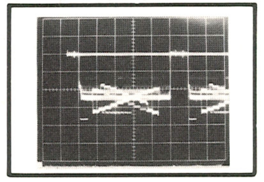
PRODUCT SAFETY NOTE

The shaded area on this schematic incorporates special features important for protection from X-radiation, fire and electrical shock hazards.
When servicing, it is essential that only manufacturer's specified parts be used for the critical components in the shaded areas of the schematic.

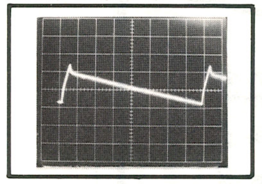
1 0.5V/DIV, 10µs/DIV



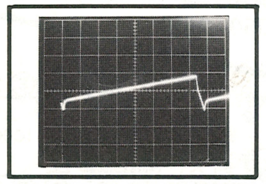
2 1V/DIV, 10µs/DIV



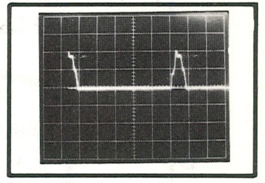
3 1V/DIV, 2ms/DIV

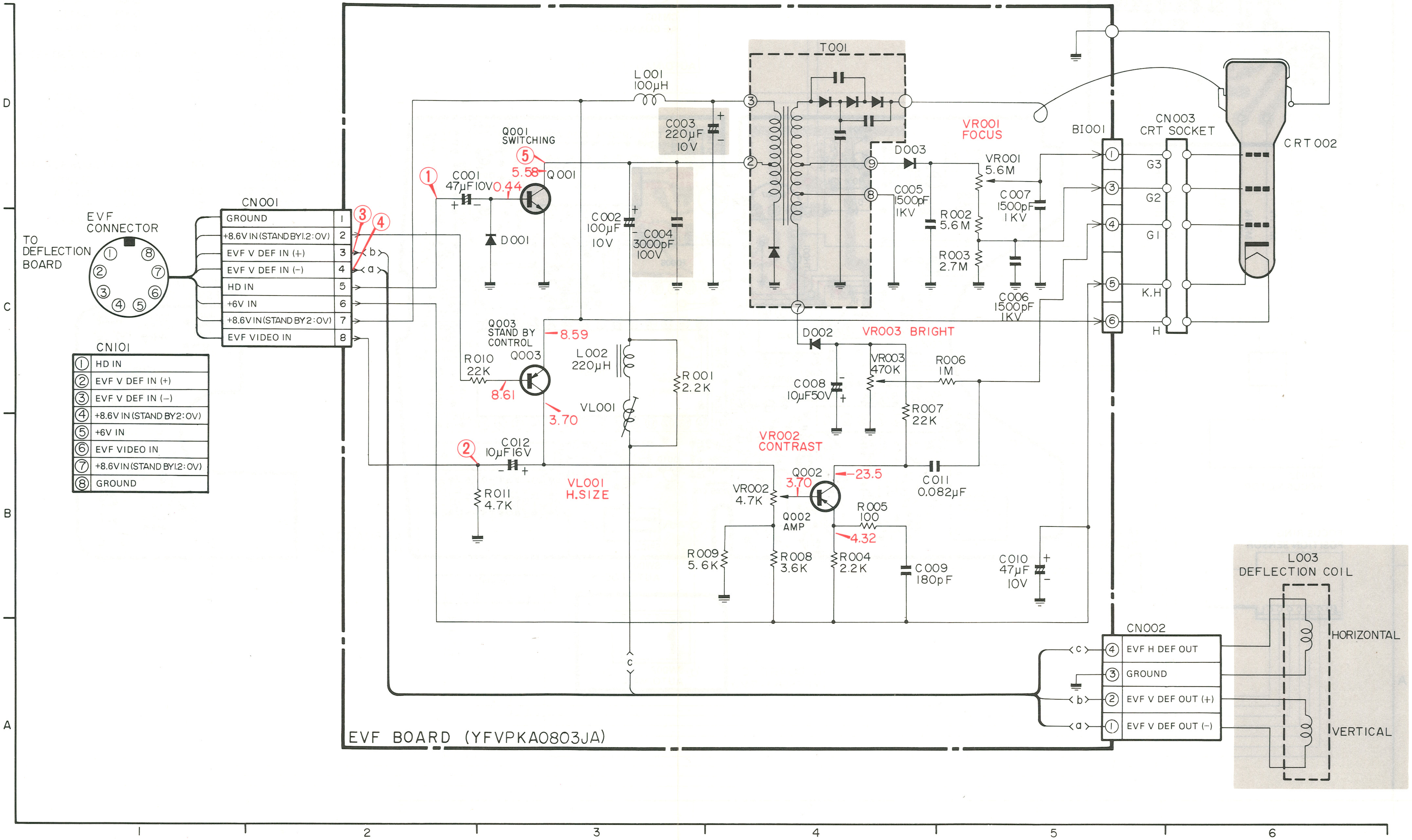


4 1V/DIV, 2ms/DIV



5 50V/DIV, 10µs/DIV

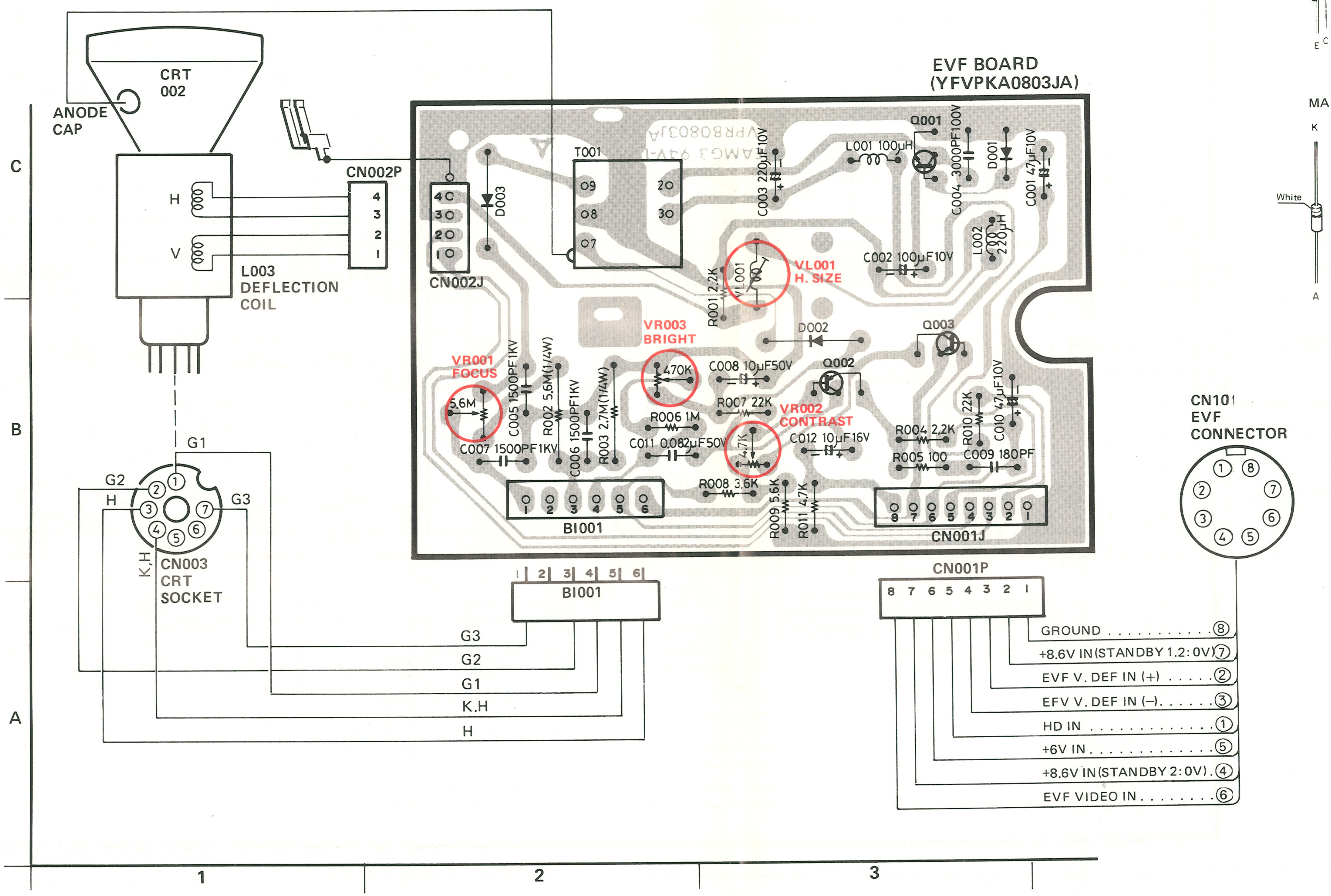


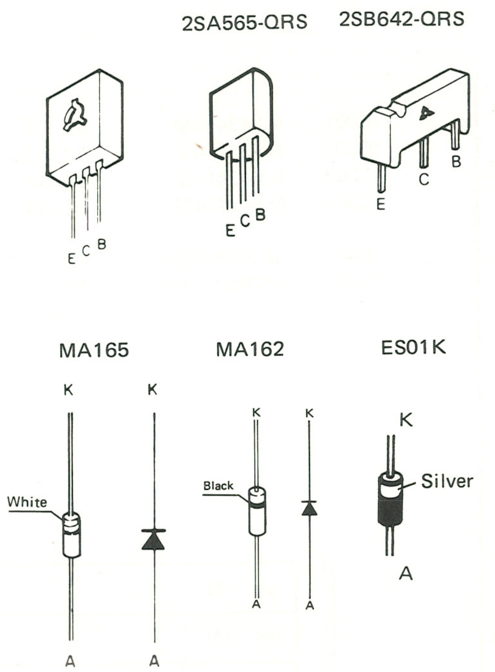


CN101

①	HD IN
②	EVF V DEF IN (+)
③	EVF V DEF IN (−)
④	+8.6V IN (STAND BY2:0V)
⑤	+6V IN
⑥	EVF VIDEO IN
⑦	+8.6V IN (STAND BY1.2:0V)
⑧	GROUND

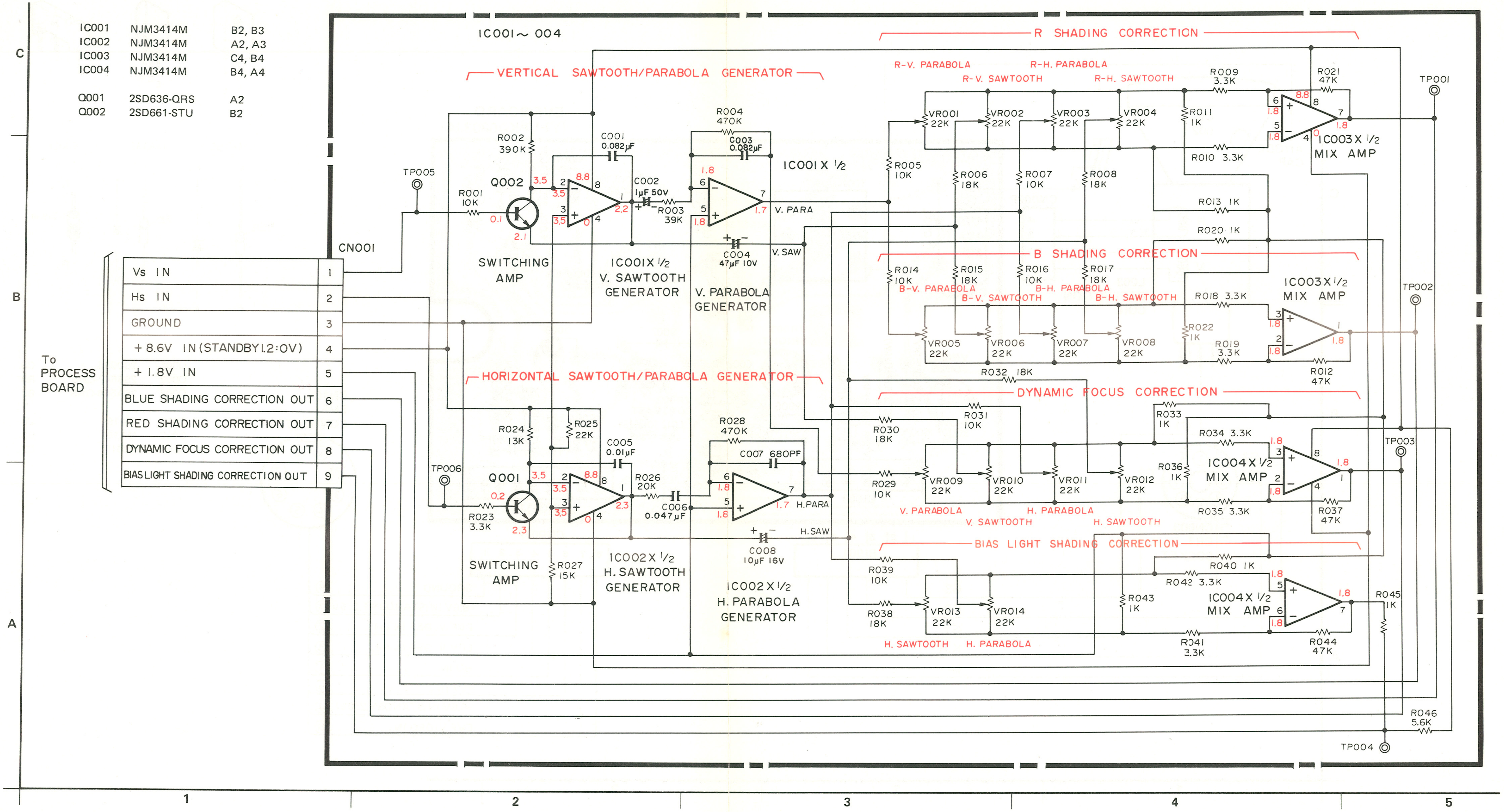
CONDUCTOR VIEW OF ELECTRONIC VIEWFINDER BOARD (YFVPKA0803JA)


EVF BOARD
(YFVPKA0803JA)
CRT
002
ANODE
CAP
H
V
L003
DEFLECTION
COIL
CN002P
4
3
2
1
CN002J
D003
T001
09
08
07
20
30
C003 220μF10V
L001 100μH
Q001
C004 3000PF100V
D001
C001 47μF10V
C002 100μF10V
L002 220μH
VL001
H. SIZE
R001 2.2K
VR003
BRIGHT
D002
Q003
VR001
FOCUS
5.6M
C005 1500PF1KV
R002 5.6M(1/4W)
C006 1500PF1KV
R003 2.7M(1/4W)
470K
R006 1M
C008 10μF50V
Q002
R007 22K
VR002
CONTRAST
4.7K
C011 0.082μF50V
C012 10μF16V
C007 1500PF1KV
R008 3.6K
R004 2.2K
R005 100
R010 22K
C010 47μF10V
C009 180PF
R009 5.6K
R011 4.7K
BI001
1 2 3 4 5 6
CN001J
8 7 6 5 4 3 2 1
G1
G2
H
G3
K.H
CN003
CRT
SOCKET
CN001P
8 7 6 5 4 3 2 1
G3
G2
G1
K.H
H
GROUND .... ⑧
+8.6V IN(STANDBY 1.2: 0V) ⑦
EVF V. DEF IN (+) ..... ②
EFV V. DEF IN (–). ..... ③
HD IN .... ①
+6V IN........... ⑤
+8.6V IN(STANDBY 2: 0V). ④
EVF VIDEO IN........ ⑥
CN101
EVF
CONNECTOR
A
B
C
1
2
3


2SA565-QRS
2SB642-QRS
E C B
E C B
E C B
MA165
MA162
ES01K
K
K
K
K
K
White
Black
Silver
A
A
A
A
A

Q001	2SD975	C3
Q002	2SB642-QRS	B3
Q003	2SA564-QRS	B3
D001	MA165	C3
D002	MA162	B3
D003	ES01F	C2

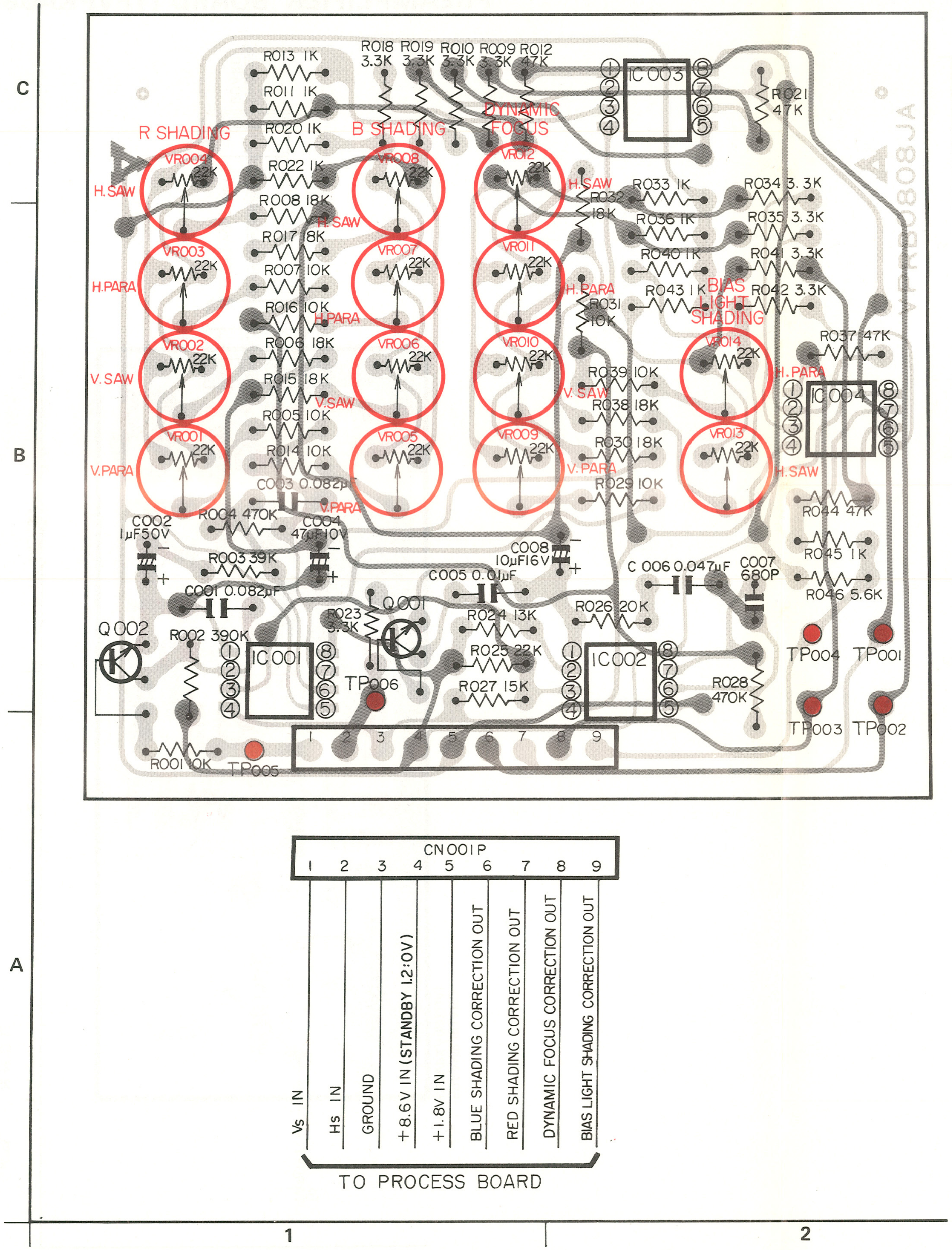
SCHEMATIC DIAGRAM OF SHADING CORRECTION BOARD (YFVPKA0808JA)

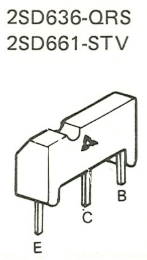


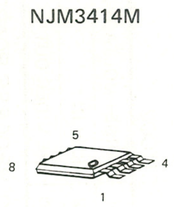
IC001	NJM3414M	B2, B3
IC002	NJM3414M	A2, A3
IC003	NJM3414M	C4, B4
IC004	NJM3414M	B4, A4
Q001	2SD636-QRS	A2
Q002	2SD661-STU	B2

C
B
A
1
2
3
4
5
IC001～004
VERTICAL SAWTOOTH/PARABOLA GENERATOR
HORIZONTAL SAWTOOTH/PARABOLA GENERATOR
R SHADING CORRECTION
B SHADING CORRECTION
DYNAMIC FOCUS CORRECTION
BIAS LIGHT SHADING CORRECTION
To PROCESS BOARD
CN001
Vs IN 1
Hs IN 2
GROUND 3
+8.6V IN (STANDBY 1.2:0V) 4
+1.8V IN 5
BLUE SHADING CORRECTION OUT 6
RED SHADING CORRECTION OUT 7
DYNAMIC FOCUS CORRECTION OUT 8
BIAS LIGHT SHADING CORRECTION OUT 9
TP005
TP006
TP001
TP002
TP003
TP004
Q002
Q001
SWITCHING AMP
SWITCHING AMP
IC001 X 1/2 V. SAWTOOTH GENERATOR
IC001 X 1/2
V. PARABOLA GENERATOR
IC002 X 1/2 H. SAWTOOTH GENERATOR
IC002 X 1/2 H. PARABOLA GENERATOR
IC003 X 1/2 MIX AMP
IC003 X 1/2 MIX AMP
IC004 X 1/2 MIX AMP
IC004 X 1/2 MIX AMP
V. PARA
V. SAW
H. PARA
H. SAW
R001 10K
R002 390K
R003 39K
R004 470K
R005 10K
R006 18K
R007 10K
R008 18K
R009 3.3K
R010 3.3K
R011 1K
R012 47K
R013 1K
R014 10K
R015 18K
R016 10K
R017 18K
R018 3.3K
R019 3.3K
R020 1K
R021 47K
R022 1K
R023 3.3K
R024 13K
R025 22K
R026 20K
R027 15K
R028 470K
R029 10K
R030 18K
R031 10K
R032 18K
R033 1K
R034 3.3K
R035 3.3K
R036 1K
R037 47K
R038 18K
R039 10K
R040 1K
R041 3.3K
R042 3.3K
R043 1K
R044 47K
R045 1K
R046 5.6K
C001 0.082μF
C002 1μF 50V
C003 0.082μF
C004 47μF 10V
C005 0.01μF
C006 0.047μF
C007 680PF
C008 10μF 16V
VR001 22K
VR002 22K
VR003 22K
VR004 22K
VR005 22K
VR006 22K
VR007 22K
VR008 22K
VR009 22K
VR010 22K
VR011 22K
VR012 22K
VR013 22K
VR014 22K
R-V. PARABOLA
R-V. SAWTOOTH
R-H. PARABOLA
R-H. SAWTOOTH
B-V. PARABOLA
B-V. SAWTOOTH
B-H. PARABOLA
B-H. SAWTOOTH
V. PARABOLA
V. SAWTOOTH
H. PARABOLA
H. SAWTOOTH
H. SAWTOOTH
H. PARABOLA
3.5
8.8
2.2
0.1
2.1
1.8
1.7
0.2
2.3
0

CONDUCTOR VIEW OF SHADING CORRECTION BOARD (YFVPKA0808JA)

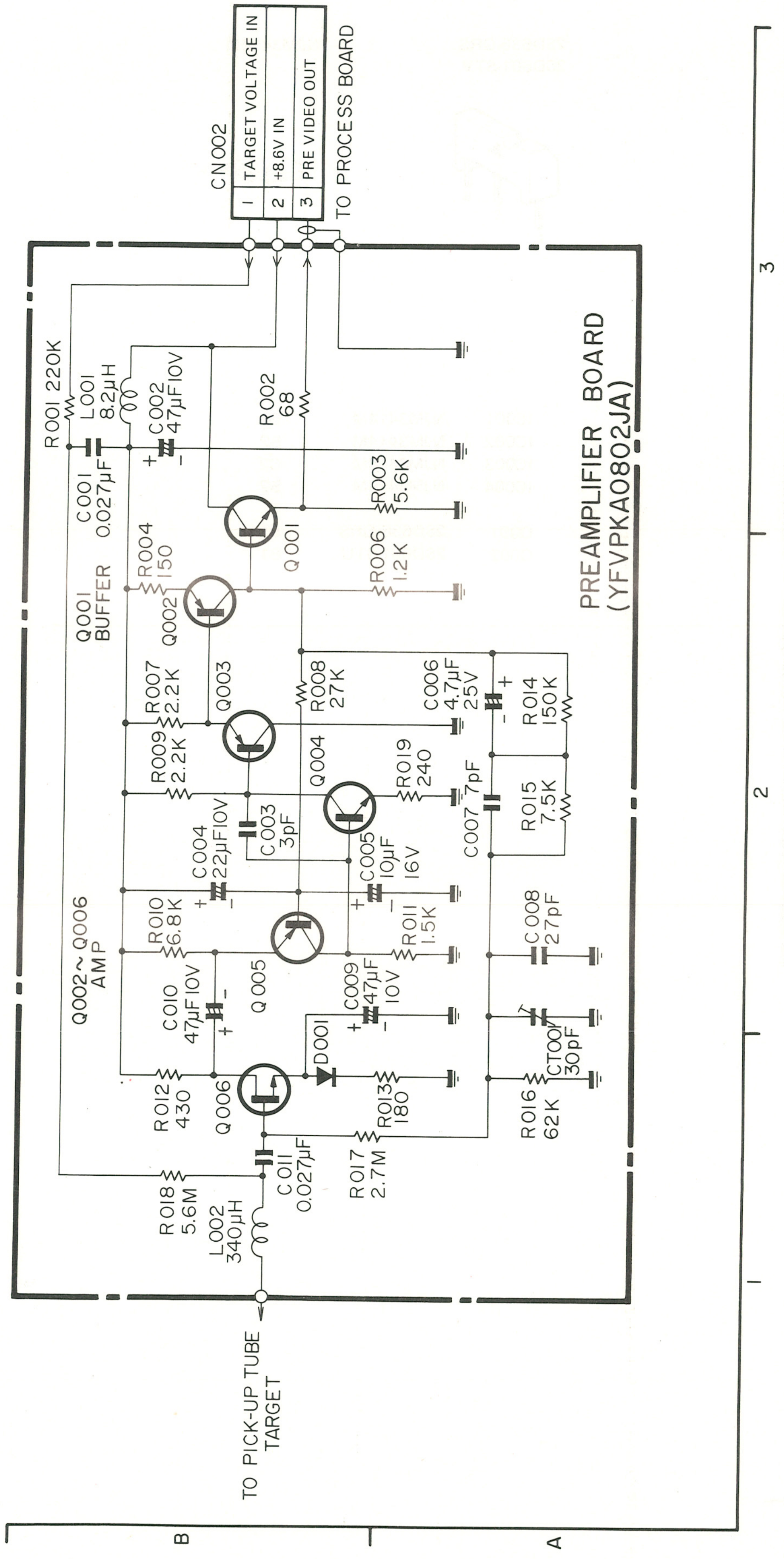

C
B
A
1
2
VPRB0808JA
R SHADING
B SHADING
DYNAMIC FOCUS
BIAS LIGHT SHADING
H.SAW
H.PARA
V.SAW
V.PARA
VR001 22K
VR002 22K
VR003 22K
VR004 22K
VR005 22K
VR006 22K
VR007 22K
VR008 22K
VR009 22K
VR010 22K
VR011 22K
VR012 22K
VR013 22K
VR014 22K
R013 1K
R011 1K
R020 1K
R022 1K
R008 18K
R017 18K
R007 10K
R016 10K
R006 18K
R015 18K
R005 10K
R014 10K
R018 3.3K
R019 3.3K
R010 3.3K
R009 3.3K
R012 47K
R021 47K
R032 18K
R031 10K
R033 1K
R036 1K
R040 1K
R043 1K
R034 3.3K
R035 3.3K
R041 3.3K
R042 3.3K
R037 47K
R039 10K
R038 18K
R030 18K
R029 10K
R044 47K
R045 1K
R046 5.6K
R004 470K
R003 39K
R002 390K
R001 10K
R023 3.3K
R024 13K
R025 22K
R027 15K
R026 20K
R028 470K
C001 0.082μF
C002 1μF50V
C003 0.082μF
C004 47μF10V
C005 0.01μF
C006 0.047μF
C007 680P
C008 10μF16V
Q001
Q002
IC001
IC002
IC003
IC004
TP001
TP002
TP003
TP004
TP005
TP006
CN001P
1 2 3 4 5 6 7 8 9
Vs IN
Hs IN
GROUND
+8.6V IN (STANDBY 1.2:0V)
+1.8V IN
BLUE SHADING CORRECTION OUT
RED SHADING CORRECTION OUT
DYNAMIC FOCUS CORRECTION OUT
BIAS LIGHT SHADING CORRECTION OUT
TO PROCESS BOARD


2SD636-QRS
2SD661-STV
E
C
B

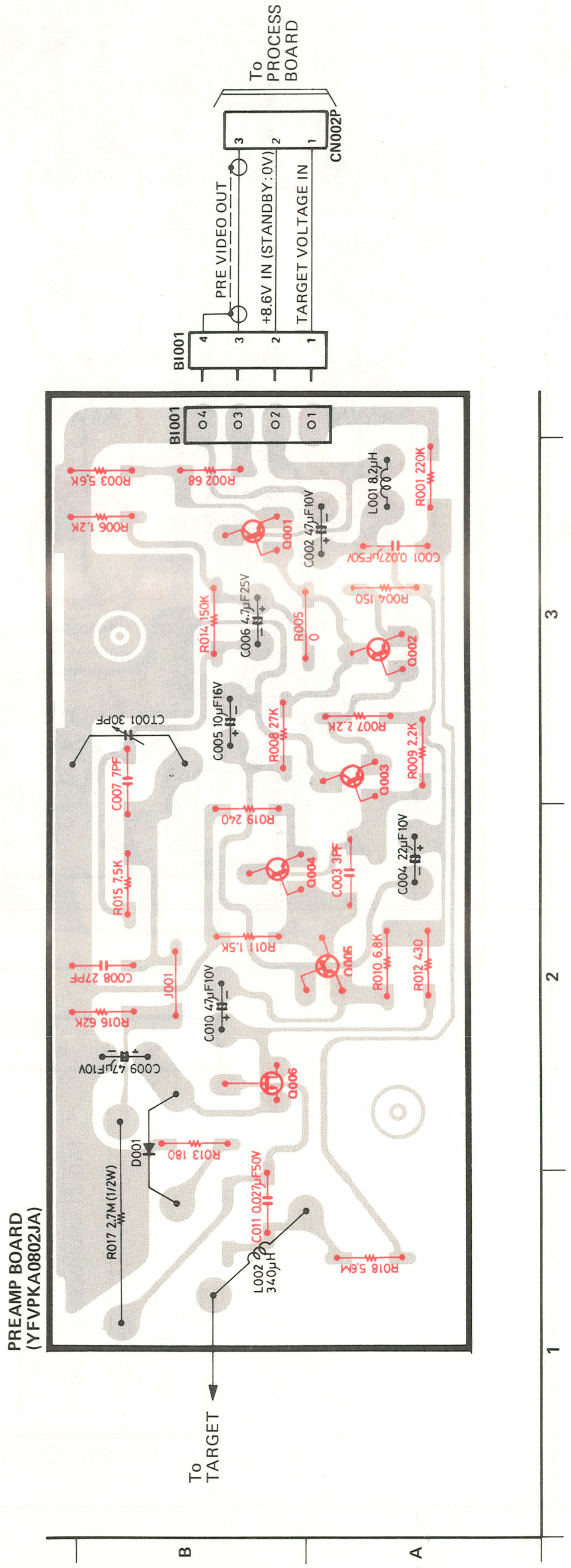

NJM3414M
5
8
4
1

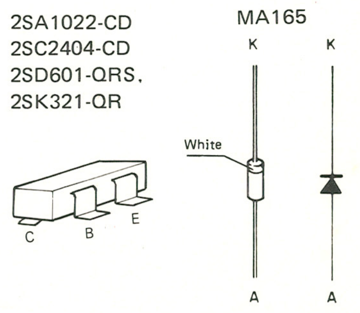
IC001	NJM3414M	B1
IC002	NJM3414M	B2
IC003	NJM3414M	C2
IC004	NJM3414M	B2
Q001	2SD636-QRS	B1
Q002	2SD661-STU	B1

SCHEMATIC DIAGRAM OF PREAMPLIFIER BOARD (YFVPKA0802JA)


CN002
1 TARGET VOLTAGE IN
2 +8.6V IN
3 PRE VIDEO OUT
TO PROCESS BOARD
R001 220K
L001 8.2µH
C002 47µF10V
C001 0.027µF
R002 68
R003 5.6K
Q001
R004 150
Q001 BUFFER
Q002
R006 1.2K
R007 2.2K
Q003
R008 27K
C006 4.7µF 25V
R014 150K
R009 2.2K
Q004
R019 240
C007 7pF
R015 7.5K
C004 22µF10V
C003 3pF
C005 10µF 16V
R010 6.8K
Q005
R011 1.5K
C008 27pF
Q002~Q006 AMP
C010 47µF10V
C009 47µF 10V
D001
CT001 30pF
R012 430
Q006
R013 180
R016 62K
R017 2.7M
C011 0.027µF
R018 5.6M
L002 340µH
TO PICK-UP TUBE TARGET
PREAMPLIFIER BOARD (YFVPKA0802JA)
3
2
1
B
A

CONDUCTOR VIEW OF PREAMPLIFIER BOARD (YFVPKA0802JA)


To PROCESS BOARD
CN002P
PRE VIDEO OUT
+8.6V IN (STANDBY:0V)
TARGET VOLTAGE IN
BI001
BI001
R003 5.6K
R002 68
L001 8.2µH
R001 220K
R006 1.2K
Q001
C002 47µF10V
C001 0.027µF50V
R014 150K
C006 4.7µF25V
R005 0
R004 150
Q002
CT001 30PF
C005 10µF16V
R008 27K
R007 2.2K
Q003
R009 2.2K
C007 7PF
R019 240
R015 7.5K
Q004
C003 3PF
C004 22µF10V
R011 1.5K
Q005
R010 6.8K
R012 430
C008 27PF
J001
C010 47µF10V
R016 62K
C009 47µF10V
Q006
D001
R013 180
R017 2.7M(1/2W)
C011 0.027µF50V
L002 340µH
R018 5.6M
PREAMP BOARD (YFVPKA0802JA)
To TARGET
3
2
1
B
A


2SA1022-CD
2SC2404-CD
2SD601-QRS,
2SK321-QR
C
B
E
MA165
White
K
A
K
A

Printed in Japan
A—232

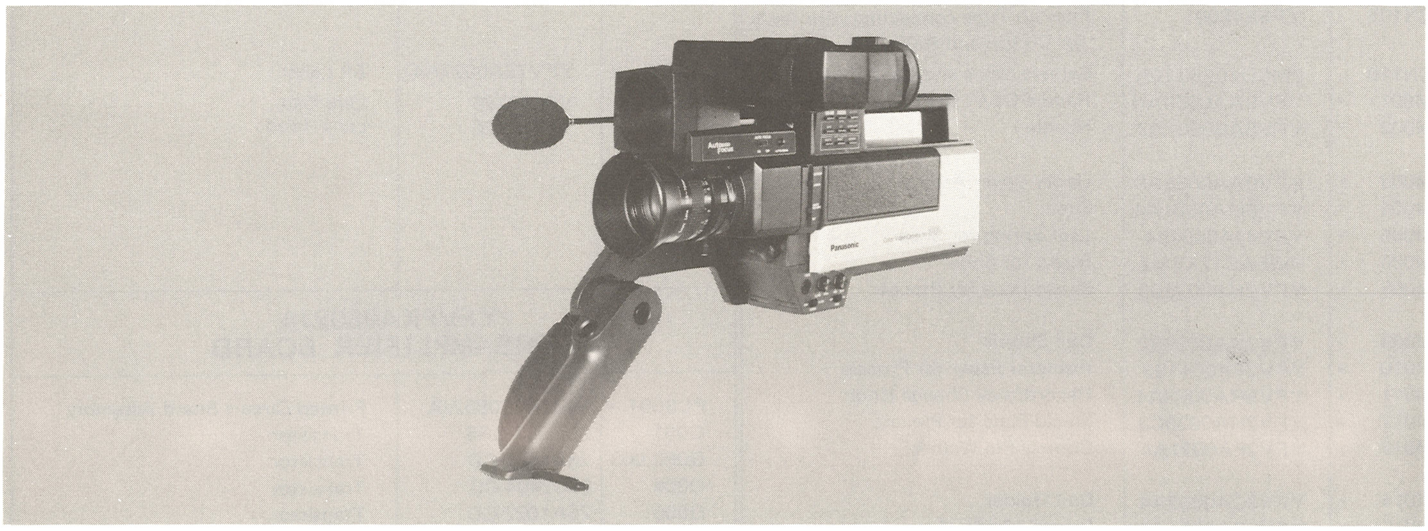
ORDER NO. VKD82070644C4

Service Manual

Vol. 4

Replacement Parts List
Exploded View

Color Video Camera
WV-4850



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Panasonic®

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Important Notice

REPLACEMENT PARTS LIST

1. Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts.
2. Components identified by * mark are new parts used from this model.

MODEL WV-4850

CAMERA HEAD

MISCELLANEOUS

SYMBOL NO.	PART NO.	DESCRIPTION
V001	S4131A	Pick-up Tube
L001	ELY18A205H	Deflection Coil Ass'y
CN105	YFSB46001	Pick-up Tube connecting wire Ass'y for CN105 and BI004
CN110	EMCU10B5T10A	Camera Cable and Cable Connector
M001 *	YFV9AA0058AN	Handle Cover Ass'y
M002 *	YFV6AB0001A3	Handle
M003 *	YFV9AA0056AS	Upper Cover Ass'y
M004 *	YFV5MA0001A4	Shoe
M005 *	YFV4JA0004B4	Leaf Spring for Shoe
M006 *	YWFAC17XFM2	Screw for Shoe
M008 *	YFV2HA0023C3	Shield Plate for Process
M009 *	YFV2KA0029B2	Coil Shassis
M010 *	YFV2PA0011B3	Insulator Paper for Process
M011 *	YFV5RA0008A4	Record/play Change Knob
M012 *	YFV2HA0020C3	Shield Plate for Preamp
M013 *	YFV2PA0021A4	Control Pin Washer
M014 *	YFV3CA0003A4	Coil Holder
M015 *	YFV3CA0004A4	Crystal Holder A
M016 *	YFV3CA0005A4	Crystal Holder B
M017 *	YFV4DA0002A4	Control Pin
M018 *	YFV9AA0060AS	Remote Control Cover Ass'y
M019 *	YFV5EK0027AS	Left Side Cover Ass'y
M020 *	YFV9AA0057AS	Right Side Cover Ass'y
M024 *	YFV5RA0005A4	Knob for outdoor/indoor Switch
M025 *	YFV5RA0006A4	Knob for White set Switch
M026 *	YFV5EB0018A3	White set Switch Cover
M027 *	YFV5ED0026AS	Front AF Cover Ass'y
M028 *	YFV2HA0021A4	Shield Case A for Vidicon Socket
M029 *	YFV2HA0022C4	Shield Case B for Vidicon Socket
M030 *	YFV2SA0015C4	Mounting Bracket for upper cover
M031 *	YFV9AA0059AS	Display Switch Cover Ass'y
M033	YWCC500LB13	Insulator Washer
M034	YWCC701FR01A	Coil Clamp
M035	YWXTALLPF23L	Crystal LPF Glass
M036	YWIR1R6X16R5	IR Cut Filter
M037	YFB1ANLITE90	Bias Light Holder
M038 *	YFV2TA0007BS	Lens Mount Ass'y
M039 *	YFV1EA0003AS	Screw for Filter Ass'y
M040	YFCCFILTER	C.C Filter
M041	YFWBFILTER	White Barance Filter
M042 *	YFV7QL0079A4	Main Label
M044	YVZC700RB50	Serial No. Label
M045 *	YFV5EB0019AS	Rear Cover Ass'y
M046 *	YFV5WA0042A4	Standby Label
M047 *	YFV5EB0021BS	Bottom Cover Ass'y
M048 *	YFV2SA0017A4	Mounting Bracket for Control Circuit Board
M049	YFV5RA0003A4	Control Knob (X2)

SYMBOL NO.	PART NO.	DESCRIPTION
M050 *	YFV5RA0007A4	Zoom/AGC Switch Knob
M051 *	YFV6JA0005A4	Fade Switch Knob
M052 *	YFV5VA0006A3	Sholder Pad
M053 *	YFV7SB0029A4	Caution Label
M059 *	YFV7SA0027A4	EP Label
M142	YF146726	Lens Cap
M143	YF146720	Lens Hood

YFVPKA0802JA
PREAMPLIFIER BOARD

SYMBOL NO.	PART NO.	DESCRIPTION		
PCB001 *	YFVPKA0802JA	Printed Circuit Board Assembly		
Q001	2SD601-QRS	Transistor		
Q002,003	2SA1022-CD	Transistor		
Q004	2SC2404-CD	Transistor		
Q005	2SA1022-CD	Transistor		
Q006	2SK321-QR	Transistor		
D001	MA165	Diode		
R001 *	ERJ8GCSJ224	Carbon	220KΩ	1/8W
R002 *	ERJ8GCSJ680	Carbon	68Ω	1/8W
R003 *	ERJ8GCSJ562	Carbon	5.6KΩ	1/8W
R004 *	ERJ8GCSG151	Carbon	150Ω	1/8W
R006 *	ERJ8GCSG122	Carbon	1.2KΩ	1/8W
R007 *	ERJ8GCSJ222	Carbon	2.2KΩ	1/8W
R008 *	ERJ8GCSJ273	Carbon	27KΩ	1/8W
R009 *	ERJ8GCSG222	Carbon	2.2KΩ	1/8W
R010 *	ERJ8GCSG682	Carbon	6.8KΩ	1/8W
R011 *	ERJ8GCSG152	Carbon	1.5KΩ	1/8W
R012 *	ERJ8GCSG431	Carbon	430Ω	1/8W
R013 *	ERJ8GCSJ181	Carbon	180Ω	1/8W
R014 *	ERJ8GCSJ154	Carbon	150KΩ	1/8W
R015 *	ERJ8GCSG752	Carbon	7.5KΩ	1/8W
R016 *	ERJ8GCSJ623	Carbon	62KΩ	1/8W
R017 *	ERO50CKG2704	Metal	2.7MΩ	1/2W
R018 *	ERJ8GCSK565	Carbon	5.6MΩ	
R019 *	ERJ8GCSG241	Carbon	240Ω	
C001 *	YF426H273XKT	Ceramic	0.027μF	
C002	ECEA1EF470	Electrolytic	47μF	25V
C003 *	YF426030SLDT	Ceramic	3pF	
C004	ECEA10Z22	Electrolytic	22μF	10V
C005	ECEA16Z10	Electrolytic	10μF	16V
C006	ECEA1VSS4R7	Electrolytic	4.7μF	35V
C007 *	YF426070CHDT	Ceramic	7pF	

SYM-BOL NO.	PART NO.	DESCRIPTION
C008 *	YF426270CHJT	Ceramic 27pF
C009	ECEA1EF470	Electrolytic 47μF 25V
C010	ECEA10Z47	Electrolytic 47μF 10V
C011 *	YF426H273XKT	Ceramic 0.027μF
CT001	TZ03R300F	Trimmer Capacitor
L001	YWL58R2J	Coil 8.2μH
L002	PREL341TE	Coil 340μH
J001,002 *	ERJ8GC0R00V	Jamper Resister
CN002-PF	EMCL0417B82V	4 pin Plug Female to Process

YFVPKB4850JA
DEFLECTION CIRCUIT BOARD

SYM-BOL NO.	PART NO.	DESCRIPTION
PCB002 *	YFVPKB4850JA	Printed Circuit Board Assembly
IC001	NJM2048M	IC
IC002	NJM2903M	IC
IC003,004	NJM3415M	IC
IC005	AN2510	IC
Q001,002	⚠2SA715-BC	Transistor
Q003~006	2SB641-QRS	Transistor
Q007	2SB745-STU	Transistor
Q008	2SD636-QR	Transistor
Q009	2SC1327-STU	Transistor
Q010	2SD636-QR	Transistor
Q011	2SD661-STU	Transistor
Q012	2SB643-QRS	Transistor
Q013	2SD638-QR	Transistor
Q014	2SD975	Transistor
Q015	2SD661-STU	Transistor
Q016	2SD638-QR	Transistor
Q017	2SB643-QRS	Transistor
Q018	2SB788-STU	Transistor
Q019	2SD958-RST	Transistor
Q020	2SB788-STU	Transistor
Q021	2SD639-QRS	Transistor
Q022	2SB788-STU	Transistor
Q023	2SD638-QR	Transistor
Q024	2SD975	Transistor
Q025	2SB641-QRS	Transistor
D001,002	EK14	Diode
D003~005	MA165	Diode
D007	MA165	Diode
D008	ES01F	Diode
D009,010	MA171	Diode
D012	MA165	Diode
R001	ERD10TJ681	Carbon 680Ω 1/8W
R002	ERD10TJ821	Carbon 820Ω 1/8W
R003	ERD10TJ162	Carbon 1.6KΩ 1/8W

SYM-BOL NO.	PART NO.	DESCRIPTION
R004	ERD10TJ132	Carbon 1.3KΩ 1/8W
R005,006	ERD10TJ105	Carbon 1KΩ 1/8W
R007	ERD10TJ621	Carbon 620Ω 1/8W
R008	ERD10TJ563	Carbon 56KΩ 1/8W
R009	ERD10TJ473	Carbon 47KΩ 1/8W
R010	ER010TKF3302	Metal 33KΩ 1/8W
R011 *	YFCR32104J	Carbon 100KΩ 1/8W
R012	ERD10TJ563	Carbon 56KΩ 1/8W
R013	ERD10TJ821	Carbon 820Ω 1/8W
R014,015	ERD10TJ103	Carbon 10KΩ 1/8W
R016	ERD10TJ682	Carbon 6.8KΩ 1/8W
R017,018	ERD10TJ103	Carbon 10KΩ 1/8W
R019	ERD10TJ682	Carbon 6.8KΩ 1/8W
R020	ERD10TJ680	Carbon 68Ω 1/8W
R021	ERD10TJ681	Carbon 680Ω 1/8W
R022	ERD10TJ561	Carbon 560Ω 1/8W
R023	ERD10TJ152	Carbon 1.5KΩ 1/8W
R024	ERD10TJ752	Carbon 7.5KΩ 1/8W
R025	ERD10TJ153	Carbon 15KΩ 1/8W
R026	ERD10TJ123	Carbon 12KΩ 1/8W
R027	ERD10TJ104	Carbon 100KΩ 1/8W
R028	ERD10TJ222	Carbon 2.2KΩ 1/8W
R029	ERD10TJ223	Carbon 22KΩ 1/8W
R030	ERD10TJ242	Carbon 2.4KΩ 1/8W
R031	ERD10TJ474	Carbon 470KΩ 1/8W
R032,033	ERD10TJ152	Carbon 1.5KΩ 1/8W
R034	ERD10TJ203	Carbon 20KΩ 1/8W
R035	ERD10TJ330	Carbon 33Ω 1/8W
R036	ERD10TJ681	Carbon 680Ω 1/8W
R037	ERD10TJ102	Carbon 1KΩ 1/8W
R038	ERD10TJ332	Carbon 3.3KΩ 1/8W
R039	ERD10TJ180	Carbon 18Ω 1/8W
R040	ERD10TJ334	Carbon 330KΩ 1/8W
R041	ERD10TJ102	Carbon 1KΩ 1/8W
R042	ERD10TJ470	Carbon 47Ω 1/8W
R043	ERD10TJ204	Carbon 200KΩ 1/8W
R044	ERD10TJ104	Carbon 100KΩ 1/8W
R045	ERD10TJ390	Carbon 39Ω 1/8W
R046	ERD10TJ103	Carbon 10KΩ 1/8W
R047	ERD10TJ102	Carbon 1KΩ 1/8W
R048	ERD10TJ151	Carbon 150Ω 1/8W
R049	ERD10TJ221	Carbon 220Ω 1/8W
R050	ERO10CKF18R0	Metal 18Ω 1/8W
R051	ERD10TJ273	Carbon 27KΩ 1/8W
R052 *	YFLP16J332	Solid Resistor 3.3KΩ 1/8W
R053	ERD10TJ161	Carbon 160Ω 1/8W
R054	ERD10TJ182	Carbon 1.8KΩ 1/8W
R055	ERD10TJ201	Carbon 200Ω 1/8W
R056	ERD10TJ274	Carbon 270KΩ 1/8W
R057	ERD10TJ223	Carbon 22KΩ 1/8W
R058	ERO25CKF3303	Metal 330KΩ 1/4W
R059	ERD25FJ565	Carbon 5.6MΩ 1/4W
R060,061	ERD10TJ103	Carbon 10KΩ 1/8W

SYMBOL NO.	PART NO.	DESCRIPTION		
R062	ERD10TJ391	Carbon	390Ω	1/8W
R063	ERD10TJ272	Carbon	2.7KΩ	1/8W
R064	ERD10TJ222	Carbon	2.2KΩ	1/8W
R065	ERO10CKF47R0	Metal	47Ω	1/8W
R066	ERD10TJ102	Carbon	1KΩ	1/8W
R067	ERO10CKF5601	Metal	5.6KΩ	1/8W
R068	ERO10CKF1302	Metal	13KΩ	1/8W
R069	ERD10TJ333	Carbon	33KΩ	1/8W
R070	ERD10TJ184	Carbon	180KΩ	1/8W
R071,073	ERD10TJ103	Carbon	10KΩ	1/8W
R074	ERD10TJ182	Carbon	1.8KΩ	1/8W
R075	ERD10TJ153	Carbon	15KΩ	1/8W
R077	ERD10TJ4R7	Carbon	4.7KΩ	1/8W
R078	ERD10TJ561	Carbon	560Ω	1/8W
R079	ERD10TJ1R0	Carbon	1Ω	1/8W
R080	ERD10TJ102	Carbon	1KΩ	1/8W
R082	ERD10TJ623	Carbon	62KΩ	1/8W
R083	ERD10TJ222	Carbon	2.2KΩ	1/8W
R084	ERO10CKF5101	Metal	5.1KΩ	1/8W
R085	ERD10TJ334	Carbon	330KΩ	1/8W
R086	ERD10TJ362	Carbon	3.6KΩ	1/8W
R087	ERD10TJ512	Carbon	5.1KΩ	1/8W
R088	ERD10TJ471	Carbon	470Ω	1/8W
R089,090	ERD10TJ564	Carbon	560KΩ	1/8W
R091	ERD10TJ101	Carbon	100Ω	1/8W
R092	ERD10TJ683	Carbon	68KΩ	1/8W
R093	ERD10TJ823	Carbon	82KΩ	1/8W
R094	ERD10TJ624	Carbon	620KΩ	1/8W
R095	ERD10TJ104	Carbon	100KΩ	1/8W
R096	ERD10TKF1502	Metal	15KΩ	1/8W
R097	ERD10TJ272	Carbon	2.7KΩ	1/8W
R098,099	ERD10TJ104	Carbon	100KΩ	1/8W
R100	ERD10TJ183	Carbon	18KΩ	1/8W
R101	ERD10TJ124	Carbon	120KΩ	1/8W
R102	ERD10TJ823	Carbon	82KΩ	1/8W
R104	ERD10TJ472	Carbon	4.7KΩ	1/8W
R110 *	ERJ8GCSJ561	Carbon	560 Ω	1/8W
R111	ERD10TJ562	Carbon	5.6KΩ	1/8W
R112	ERD10TJ472	Carbon	4.7KΩ	1/8W
VR001	EVM8AGA00BS3	Variable Resistor	6.8KΩ	
VR002	EVM8AGA00B12	Variable Resistor	100Ω	
VR003	EVN8ACA00B14	Variable Resistor	10KΩ	
VR004	EVN8ACA00BE3	Variable Resistor	2.2KΩ	
VR005	EVN8ACA00BY4	Variable Resistor	33KΩ	
VR006	EVN8ACA00BY3	Variable Resistor	3.3KΩ	
VR007	EVN8ACA00BY4	Variable Resistor	33KΩ	
VR008	YWH0651A100	Variable Resistor	100Ω	
VR009	EVN8ACA00BQ3	Variable Resistor	4.7KΩ	
VR010	EVN8ACA00BC3	Variable Resistor	1.5KΩ	
VR011	EVN8ACA00BQ5	Variable Resistor	470KΩ	
VR012,013	EVN8ACA00BQ4	Variable Resistor	47KΩ	
VR014	EVM8AGA00BQ4	Variable Resistor	47KΩ	
Z001	EVM72GA00089	Block Resistor		
C001	YF426472XMS	Ceramic	4700pF	
C002	YF426470SLKS	Ceramic	47pF	
C003	ECEA1ESS101	Electrolytic	100μF	25V

SYMBOL NO.	PART NO.	DESCRIPTION		
C004~006	ECEA1CF221	Electrolytic	220μF	16V
C007 *	YF426473XMS	Ceramic	0.047μF	
C008	ECEA1HSS2R2	Electrolytic	2.2μF	50V
C009	YF426473XMS	Ceramic	0.047μF	
C010	YF426102CHJS	Ceramic	1000pF	
C011 *	YF426224FZS	Ceramic	0.22μF	
C012	ECEA1CSS100	Electrolytic	10μF	16V
C013,014	ECEA1CF221	Electrolytic	220μF	16V
C015,016 *	YF426472XMS	Ceramic	4700pF	
C017	ECEA1ASS221	Electrolytic	220μF	10V
C018 *	YF426101XMS	Ceramic	100pF	
C019	ECEA1HSSR22	Electrolytic	0.22μF	50V
C020	ECEA1ASS101	Electrolytic	100μF	10V
C021 *	YF426473XKS	Ceramic	0.047μF	
C022,023	ECEA1ASS470	Electrolytic	47μF	10V
C024 *	YF426101LKS	Ceramic	100pF	
C025	ECEA1HSS2R2	Electrolytic	2.2μF	50V
C026	ECEA1ASS220B	Electrolytic	22μF	10V
C027	ECEA1ASS470	Electrolytic	47μF	10V
C028	ECEA1HSS2R2	Electrolytic	2.2μF	50V
C029	ECEA1ASS331	Electrolytic	330μF	10V
C030,031	ECEA1ASS470	Electrolytic	47μF	10V
C032	ECEA1AF101	Electrolytic	100μF	10V
C033	ECQP1301JZ	Plastic	300pF	100V
C034	ECEA1AF470	Electrolytic	47μF	10V
C035	ECQV05104J	Plastic	0.1μF	50V
C036 *	YF426391CHUS	Ceramic	390pF	
C037,038	ECEA1ASS470	Electrolytic	47μF	10V
C039	ECQK1104JG	Plastic	0.1μF	100V
C040 *	YF426102XMS	Ceramic	1000pF	
C041	ECEA1ASS470	Electrolytic	47μF	10V
C042 *	YF426221XMS	Ceramic	220pF	
C043	ECEA0JSS330	Electrolytic	33μF	6.3V
C044	ECEA2AS010	Electrolytic	1μF	100V
C045	ECEA0JSS471	Electrolytic	470μF	6.3V
C046	ECQP1152JZ	Plastic	1500pF	100V
C048	ECEA1CSS100	Electrolytic	10μF	16V
C049	ECEA1ASS470	Electrolytic	47μF	10V
C050 *	YF426223XKS	Ceramic	0.022μF	
C051	ECEA1HN010SB	Electrolytic	1μF	50V
C052	ECEA1ESS4R7	Electrolytic	4.7μF	25V
C053	ECEA1ASS221	Electrolytic	220μF	10V
C054 *	YF426911CHJS	Ceramic	910pF	
C055	ECEA1ASS470	Electrolytic	47μF	10V
C056	ECQV05684JZ	Plastic	0.68μF	50V
C057	ECEA1ESS4R7	Electrolytic	47μF	25V
C059	ECEA1ASS470	Electrolytic	47μF	10V
C060	ECQP1682JZ	Plastic	6800pF	100V
C061	ECEA1ASS221	Electrolytic	220μF	10V
C062	ECEA2AS010	Electrolytic	1μF	100V
C063	ECQE2473KS	Plastic	0.047μF	250V
C064	ECEA2AS010	Electrolytic	1μF	100V
C065	ECQE2473KS	Plastic	0.047μF	250V
C066 *	YFDE979B152K	Ceramic	1500pF	
C067	ECEA2AS010	Electrolytic	1μF	100V
C068	ECEA1CSS100	Electrolytic	10μF	16V

SYMBOL NO.	PART NO.	DESCRIPTION		
C069 *	YF426102XMS	Ceramic	1000pF	
C070	ECEA0JSS330	Electrolytic	33μF	6.3V
C071	ECEA1ESS4R7	Electrolytic	4.7μF	25V
C080	ECEA1HSS2R2	Electrolytic	2.2μF	50V
C081	ECEA1ASS101	Electrolytic	100μF	10V
C082	ECEA1CSS100	Electrolytic	10μF	16V
L001	YFPC650K	Coil	65μH	
L002,003	YFPF471K	Coil	470μH	
L004,005	YFPC650K	Coil	65μH	
L006	YWL10103JZ	Coil	10mH	
L007	YFVL303	Coil	30mH	
L008	YFVC101J	Coil	100μH	
L009	YWL5150J	Coil	15μH	
T001	YFHIPAKCAM90	Flyback Transformer		
CN001-JM	EMCS0550Z	5 pin Jack Male		
CN003-JM,	EMCS0550Z	5 pin Jack Male		
CN005-JM,	EMCS0850Z	8 pin Jack Male		
CN006-JM~ 008-JM	EMCS0250Z	2 pin Jack Male		
CN009-JM	EMCS0350Z	3 pin Jack Male		
CN010-JM	EMCS0450Z	4 pin Jack Male		
CN011-JM	EMCS0750Z	7 pin Jack Male		
BI004 *	YFSB46001	6 pin Connecting Wire Ass'y for BI004 and CN105		
JA *	YFFS2N254B10	10 p Flat Cable		
JB *	YFFSN23B10	10p Flat Cable		
JC *	YFFSN23B11	11p Flat Cable		
M055 *	YFV2HA0026B4	SR Shield Case A		
M056 *	YFV2HA0030A4	SR Shield Case B		
M057 *	YFV2HA0027A4	SR Shield Cover		

YFVPKC4850JA
PROCESS CIRCUIT BOARD

SYMBOL NO.	PART NO.	DESCRIPTION		
PCB003 *	YFVPKC4850JA	Printed Circuit Board		
IC001	AN2110S	IC		
IC002	AN2210S	IC		
IC003	AN2310S	IC		
IC004	AN2410S	IC		
IC005	AN2320S	IC		
IC006	AN2560S	IC		
IC008	NJM3414M	IC		
IC009	MN6164	LSI		
IC010	AN6914S	IC		
IC011	MN6064	IC		
Q001-003	2SD636-QRS	Transistor		
Q004	2SD601-QRSTW	Transistor		
Q005,006	2SC2404-CDTW	Transistor		
Q007	2SB643-QRS	Transistor		
Q009	2SD636-QRS	Transistor		
Q010,011	2SB641-QRS	Transistor		
Q012	2SD636-QRS	Transistor		
Q013	2SB641-QRS	Transistor		
Q014	2SC828-QRS	Transistor		
D001	MA165	Diode		
D003~010	MA165	Diode		
R001	ERD10TJ911	Carbon	910Ω	1/8W
R002	ERD10TJ223	Carbon	22KΩ	1/8W
R003	ERD10TJ471	Carbon	470Ω	1/8W
R004,005	ERD10TJ102	Carbon	1KΩ	1/8W
R007	ERD10TJ183	Carbon	18KΩ	1/8W
R008	ERD10TJ333	Carbon	33KΩ	1/8W
R009	ERD10TJ102	Carbon	1KΩ	1/8W
R010	ERD10TJ223	Carbon	22KΩ	1/8W
R014	ERD10TJ681	Carbon	680Ω	1/8W
R015	ERD10TJ563	Carbon	56KΩ	1/8W
R017	ERD10TJ184	Carbon	180KΩ	1/8W
R018 *	YFCR32823J	Carbon	82KΩ	1/8W
R019 *	ERJ8GLSG512	Carbon	5.1KΩ	1/8W
R020 *	ERJ8GCSG821	Carbon	820Ω	1/8W
R021	ERD10TJ822	Carbon	8.2KΩ	1/8W
R022	ERD10TJ222	Carbon	2.2KΩ	1/8W
R024	ERD10TJ152	Carbon	1.5KΩ	1/8W
R025	ERD10TJ562	Carbon	5.6KΩ	1/8W
R026	ERD10TJ154	Carbon	150KΩ	1/8W
R027	ERD10TJ683	Carbon	68KΩ	1/8W
R029	ERD10TJ751	Carbon	750Ω	1/8W
R030 *	ERJ8GCSJ182	Carbon	1.8KΩ	1/8W
R031	ERD10TJ184	Carbon	180KΩ	1/8W
R032	ERD10TJ684	Carbon	680KΩ	1/8W
R033 *	ERJ8GCSJ561	Carbon	560Ω	1/8W
R034	ERD10TJ102	Carbon	1KΩ	1/8W
R035	ERD10TJ822	Carbon	8.2KΩ	1/8W
R036	ERO10CKF1001	Metal	1KΩ	1/8W
R037 *	ERJ8GCSJ184	Carbon	180KΩ	1/8W
R038 *	ERJ8GCSJ393	Carbon	39KΩ	1/8W
R039	ERD10TJ153	Carbon	15KΩ	1/8W
R040	ERD10TJ273	Carbon	27KΩ	1/8W
R041	ERD10TJ102	Carbon	1KΩ	1/8W
R042	ERD10TJ123	Carbon	12KΩ	1/8W
R043 *	ERJ8GCSJ680	Carbon	68Ω	
R044 *	ERJ8GCSJ683	Carbon	68KΩ	
R045 *	ERJ8GCSJ472	Carbon	4.7KΩ	
R046	ERD10TJ562	Carbon	5.6KΩ	1/8W
R047	ERD10TJ153	Carbon	15KΩ	1/8W
R048	ERD10TJ333	Carbon	33KΩ	1/8W
R049	ERD10TJ562	Carbon	5.6KΩ	1/8W
R050	ERD10TJ272	Carbon	2.7KΩ	1/8W
R051	ERD10TJ271	Carbon	270Ω	1/8W
R052	ERD10TJ103	Carbon	10KΩ	1/8W
R053,054	ERD10TJ102	Carbon	1KΩ	1/8W
R055	ERD10TJ152	Carbon	1.5KΩ	1/8W
R056	ERD10TJ563	Carbon	56KΩ	1/8W
R057	ERD10TJ102	Carbon	1KΩ	1/8W
R058	ERD10TJ182	Carbon	1.8KΩ	1/8W
R059 *	ERJ8GCSJ221	Carbon	220Ω	1/8W
R060 *	YFCR32622J	Carbon	6.2KΩ	1/8W
R061 *	ERJ8GCSJ183	Carbon	18KΩ	1/8W
R062 *	ERJ8GCSJ332	Carbon	3.3KΩ	1/8W
R064	ERD10TJ103	Carbon	10KΩ	1/8W
R066 *	ERJ8GCSJ103	Carbon	10KΩ	1/8W
R067~069 *	ERJ8GCSJ105	Carbon	1MΩ	1/8W
R070	ERD10TJ472	Carbon	4.7KΩ	1/8W
R071 *	ERJ8GCSJ103	Carbon	10KΩ	1/8W

SYMBOL NO.	PART NO.	DESCRIPTION		
R072	ERD10TJ150	Carbon	15Ω	1/8W
R073	ERD10TJ122	Carbon	1.2KΩ	1/8W
R075 *	ERJ8GCSJ821	Carbon	820Ω	1/8W
R076	ERD10TJ392	Carbon	3.9KΩ	1/8W
R077 *	ERJ8GCSJ561	Carbon	560Ω	1/8W
R078 *	ERJ8GCSJ103	Carbon	10KΩ	1/8W
R079	ERD10TJ102	Carbon	1KΩ	1/8W
R080	YFCR32333J	Carbon	33KΩ	1/8W
R081,082 *	YFCR32102J	Carbon	1KΩ	1/8W
R083	ERD10TJ103	Carbon	10KΩ	1/8W
R084	ERD10TJ561	Carbon	560Ω	1/8W
R085	ERD10TJ751	Carbon	750Ω	1/8W
R087	ERD10TJ102	Carbon	1KΩ	1/8W
R093 *	ERJ8GCSJ472	Carbon	4.7KΩ	1/8W
R094 *	ERJ8GCSJ563	Carbon	56KΩ	1/8W
R095 *	ERJ8GCSJ682	Carbon	6.8KΩ	1/8W
R096	ERD10TJ103	Carbon	10KΩ	1/8W
R097	ERD10TJ112	Carbon	1.1KΩ	1/8W
R098	ERD10TJ272	Carbon	2.7KΩ	1/8W
R099 *	ERJ8GCSJ751	Carbon	750Ω	1/8W
R100 *	ERJ8GCSJ561	Carbon	560Ω	1/8W
R101 *	ERJ8GCSG433	Carbon	43KΩ	1/8W
R102 *	ERJ8GCSG393	Carbon	39KΩ	1/8W
R115 *	YFCR32163J	Carbon	16KΩ	1/8W
R116,117 *	YFCR32124J	Carbon	120KΩ	1/8W
R118	ERD10TJ223	Carbon	22KΩ	1/8W
R119 *	YFCR32223J	Carbon	22KΩ	1/8W
R120,121 *	ERJ8GCSJ683	Carbon	68KΩ	1/8W
R122	ERD10TJ683	Carbon	68KΩ	1/8W
R123	ERD10TJ273	Carbon	27KΩ	1/8W
R124 *	ERJ8GCSJ683	Carbon	68KΩ	1/8W
R125	ERD10TJ103	Carbon	10KΩ	1/8W
R126	ERD10TJ334	Carbon	330KΩ	1/8W
R127	ERD10TJ273	Carbon	27KΩ	1/8W
R128	ERD10TJ153	Carbon	15KΩ	1/8W
R129	ERD10TJ222	Carbon	2.2KΩ	1/8W
R130	ERD25FJ155	Carbon	1.5MΩ	1/4W
R131	ERD10TJ824	Carbon	820KΩ	1/8W
R132	ERD10TJ393	Carbon	39KΩ	1/8W
R133 *	ERJ8GCSJ154	Carbon	150KΩ	1/8W
R134	ERD10TJ393	Carbon	39KΩ	1/8W
R135	ERD10TJ223	Carbon	22KΩ	1/8W
R136,137 *	YFCR32104J	Carbon	100KΩ	1/8W
R138,139	ERD10TJ223	Carbon	22KΩ	1/8W
R140	ERD10TJ104	Carbon	100KΩ	1/8W
R141	ERD10TJ823	Carbon	82KΩ	1/8W
R148	ERD10TJ822	Carbon	8.2KΩ	1/8W
R149 *	ERJ8GCSJ182	Carbon	1.8KΩ	1/8W
R151	ERD10TJ562	Carbon	5.6KΩ	1/8W
R152	ERD10TJ223	Carbon	22KΩ	1/8W
R153	ERD10TJ272	Carbon	2.7KΩ	1/8W
R154	ERD10TJ562	Carbon	5.6KΩ	1/8W
R155	ERD10TJ102	Carbon	1KΩ	1/8W
R156	ERD10TJ223	Carbon	22KΩ	1/8W
R157	ERD10TJ563	Carbon	56KΩ	1/8W
R158	ERD10TJ223	Carbon	22KΩ	1/8W

SYMBOL NO.	PART NO.	DESCRIPTION		
R164	ERD10TJ222	Carbon	2.2KΩ	1/8W
R165,166	ERD10TJ103	Carbon	10KΩ	1/8W
R167 *	ERJ8GCS222	Carbon	2.2KΩ	1/8W
R180 *	ERJ8GCS221	Carbon	220Ω	1/8W
R181 *	ERJ8GCS222	Carbon	2.2KΩ	1/8W
R182	ERD10TJ821	Carbon	820Ω	1/8W
R183	ERD10TJ563	Carbon	56KΩ	1/8W
R184	ERD10TJ472	Carbon	4.7KΩ	1/8W
R185	ERD10TJ103	Carbon	10KΩ	1/8W
R186,187	ERD10TJ272	Carbon	2.7KΩ	1/8W
R188 *	ERJ8GCSJ154	Carbon	150KΩ	1/8W
R190	ERD10TJ223	Carbon	22KΩ	1/8W
R191 *	ERJ8GCSJ471	Carbon	470Ω	1/8W
VR001	EVN8ACA00BE4	Variable Resistor		
VR002	EVN8ACA00B14	Variable Resistor	10KΩ	
VR003	YFH0621A680X	Semi Fixed Resistor	680Ω	
VR004	EVN8ACA00B14	Variable Resistor	10KΩ	
VR005	EVM8AGA00B13	Variable Resistor	1KΩ	
VR006	EVN8ACA00BE3	Variable Resistor	2.2KΩ	
VR007	EVN8ACA00BY3	Variable Resistor	3.3KΩ	
VR008,009	EVN8ACA00BE3	Variable Resistor	2.2KΩ	
VR010-012	EVN8ACA00BQ4	Variable Resistor	47KΩ	
VR013	EVN8ACA00BE3	Variable Resistor	2.2KΩ	
VR014-016	EVN8ACA00BQ4	Variable Resistor	47KΩ	
VR017	EVM8AGA00B14	Variable Resistor	10KΩ	
VR018	EVM8AGA00BQ2	Variable Resistor	470Ω	
Z001	EXBH84265J	Block Resistor		
Z002	EXBH86263J	Block Resistor		
Z003	EXBD86264J	Block Resistor		
Z004	EXBD87266J	Block Resistor		
Z005	EXBH83267J	Block Resistor		
C001 *	YF426680CHJS	Ceramic	68pF	
C002	ECEA1ASS470	Electrolytic	47µF	10V
C003 *	YF426473XMS	Ceramic	0.047µF	
C004	ECEA1HS010	Electrolytic	1µF	50V
C005	ECEA1ASS220B	Electrolytic	22µF	10V
C006 *	YF426473XMS	Ceramic	0.047µF	
C007	ECEA1VSS4R7B	Electrolytic	4.7µF	35V
C008	ECEA1CSS100	Electrolytic	10µF	16V
C009	ECEA1ASS470	Electrolytic	47µF	10V
C010	ECEA1CSS100	Electrolytic	10µF	16V
C011 *	YF426222XKS	Ceramic	2200pF	
C012 *	YF426121CHJS	Ceramic	120pF	
C013 *	YF426470SLKS	Ceramic	47pF	
C014 *	YF426473XMS	Ceramic	0.047µF	
C015	ECEA1ASS470	Electrolytic	47µF	10V
C016	ECEA1CSS100	Electrolytic	10µF	16V
C017	ECEA1ASS220	Electrolytic	22µF	10V
C018	ELEA0JS102	Electrolytic	1000µF	6.3V
C019	ECEA1ASS470	Electrolytic	47µF	10V
C021 *	YF426473XMS	Ceramic	0.047µF	
C022	ECEA1ASS470	Electrolytic	47µF	10V
C022 *	YF426330CHJS	Ceramic	33pF	
C023,024	ECEA1ASS470	Electrolytic	47µF	10V
C025~027 *	YF426473XMS	Ceramic	0.047µF	
C028~030	ECEA1HSS3R3	Electrolytic	3.3µF	50V

SYM-BOL NO.	PART NO.	DESCRIPTION		
C031,032 *	YF426222XMS	Ceramic	2200pF	
C033 *	YF426681SLKS	Ceramic	680pF	
C034 *	YF426473XMS	Ceramic	0.047μF	
C035 *	YF426681SLKS	Ceramic	680pF	
C036	ECEA1ASS470	Electrolytic	47μF	10V
C037 *	YF426681SLKS	Ceramic	680pF	
C039 *	YF426100CHKS	Ceramic	10pF	
C040 *	YF426220SLKS	Ceramic	22pF	
C041 *	YF426222XKS	Ceramic	2200pF	
C042 *	YF426473XMS	Ceramic	0.047μF	
C043	ECEA10Z47	Electrolytic	47μF	10V
C044 *	YF426330CHJS	Ceramic	33pF	
C045	ECEA10Z47	Electrolytic	47μF	10V
C046	ECEA1CSS100	Electrolytic	10μF	16V
C047,048	ECEA1ASS470	Electrolytic	47μF	10V
C049 *	YF426222XMS	Ceramic	2200pF	
C050 *	YF426681SLKS	Ceramic	680pF	
C051	ECEA10Z100K	Electrolytic	100μF	10V
C052 *	YF426473XMS	Ceramic	0.047μF	
C053	ECEA1ASS470	Electrolytic	47μF	10V
C054	ECEA1ASS330	Electrolytic	33μF	10V
C055	ECEA1ASS470	Electrolytic	47μF	10V
C056-058 *	YF426473XMS	Ceramic	0.047μF	
C059	ECEA0JSS470	Electrolytic	47μF	6.3V
C060-063 *	YF426391SLKS	Ceramic	390pF	
C064 *	YF426473XMS	Ceramic	0.047μF	
C065	ECEA1ASS470	Electrolytic	47μF	10V
C066	ECEA1CN100S	Electrolytic	10μF	16V
C067, 068 *	YF426222XMS	Ceramic	2200pF	
C069 *	YF426270CHJS	Ceramic	27pF	
C070 *	YF426102XMS	Ceramic	1000pF	
C071 *	YF426070CHDS	Ceramic	7pF	
C072	ECEA1ASS470	Electrolytic	47μF	10V
C074 *	YF426101CHJS	Ceramic	100pF	
C075 *	YF426680CHJS	Ceramic	68pF	
C078 *	YF426471SLKS	Ceramic	470pF	
C079 *	YF426271SLJS	Ceramic	270pF	
C080,090 *	YF426221SLKS	Ceramic	220pF	
C091 *	YF426101SLKS	Ceramic	100pF	
C095	ECEA1ASS470	Electrolytic	47μF	10V
C098 *	YF426470SLKS	Ceramic	47pF	
C099	ECKF1H471KB	Ceramic	470pF	50V
C100	ECQV05104JZ	Plastic	0.1μF	50V
C101 *	YF426103XMS	Ceramic	0.01μF	
C102	ECKF1H562K	Ceramic	5600pF	50V
CT001,002	YFTZ03R300F	Trimmer Capacitor		
CT003	YFTZ03R200F	Trimmer Capacitor		
DL001	EFDMA645B85A	Delay Line		
DL002	EFDET645B85A	Delay Line		
DL003	EFDMA645B85C	Delay Line		
L001	YWL5101J	Coil	100μH	
L002,003	ELET8R2KAM	Coil	8.2μH	
L004,005	YWL5150J	Coil	15μH	
L006	ELET8R2KAM	Coil	8.2μH	
L007-010	YW5150J	Coil	15μH	
L011,012	ELET8R2KAM	Coil	8.2μH	

SYM-BOL NO.	PART NO.	DESCRIPTION		
L013	ELET2R2KAM	Coil	2.2μH	
SW001	YWSSS21200	Slide Switch		
X001	YFMS30914R3M	Crystal Oscillator		
CF001	YFSLC008	Filter		
CF002	YFSLC004	Filter		
CF003	YFSLC011A	Filter		
CF004	YFSLC009	Filter		
CF005	YFSLC010A	Filter		
CF006	YFSLC005	Filter		
CF007	YFSLC006	Filter		
CF008	YFSLC007	Filter		
CN001-PF	EMCM0916D42Y	9 pin Plug Female		
CN001-JM-003-JM	EMCS0350Z	3 pin Jack Male		
CN004-JM	EMCS0380Z	3 pin Jack Male		
CN005-JM	EMCS0750Z	7 pin Jack Male		
CN006-JM	EMCS0650Z	6 pin Jack Male		
CN007-JM	EMCS0350Z	3 pin Jack Male		
JA *	YFFS2N115D5	5p Flat Cable		
JD *	YFFS2N254B20	20p Flat Cable		
M021 *	YFV2HA0025E4	Shield Case A		
M022 *	YFV2HA0031B4	Shield Cover for Sync.		
M023 *	YFV2HA0040A4	Shield Case B		

YFVPKD0801JA
MICRO PROCESSOR BOARD

SYM-BOL NO.	PART NO.	DESCRIPTION		
PCB004 *	YFVPKD0801JA	Printed Circuit Board Assembly		
IC001	NJM3414M	IC		
IC002	MN1455AVD2	LSI		
IC003	MN1227A	LSI		
IC004	MN1453AVG1	LSI		
IC005	MN6280	LSI		
Q001	2SD636-QRS	Transistor		
Q002	2SB641-QRS	Transistor		
Q003	2SD661-TU	Transistor		
Q004	2SD636-QRS	Transistor		
Q005	2SD639-QRS	Transistor		
Q006-013	2SB641-QRS	Transistor		
Q014	2SD636-QRS	Transistor		
Q015,016	2SB641-QRS	Transistor		
D001-014	MA165	Diode		
D017	MA165	Diode		
R001	ERD10TJ223	Carbon	22KΩ	
R002	ERJ8GCSJ154	Carbon	150KΩ	
R003 *	YFLR32106K or ERJ8GCSJ106	Carbon	10MΩ	1/8W
R004	ERD10TJ104	Carbon	100KΩ	1/8W
R005 *	YFCR32102J or ERJ8GCSJ102	Carbon	1KΩ	1/8W
R006 *	ERD10TJ333	Carbon	33KΩ	
R007	ERJ8GCSJ103	Carbon	10KΩ	
R008 *	ERJ8GCSJ222	Carbon	2.2KΩ	1/8W

SYM-BOL NO.	PART NO.	DESCRIPTION
R009	YFCR32333J or ERJ8GCSJ333	Carbon 33KΩ 1/8W
R010	ERD10TJ122	Carbon 1.2KΩ 1/8W
R011	ERD10TJ223	Carbon 22KΩ 1/8W
R012	ERD10TJ103	Carbon 10KΩ 8W
R013	ERD10TJ153	Carbon 15KΩ 8W
R014	ERD10TJ103	Carbon 10KΩ 1/8W
R015~17 *	ERJ8GCSJ103	Carbon 10KΩ 1/8W
R018 *	ERJ8GCSJ222	Carbon 2.2KΩ 1/8W
R019 *	YFCR32153	Carbon 15KΩ 1/8W
R020	ERD10TJ562	Carbon 5.6KΩ 1/8W
R021	ERD10TJ223	Carbon 22KΩ 1/8W
R022	ERD10TJ473	Carbon 47KΩ 1/8W
R023	ERD10TJ393	Carbon 39KΩ 1/8W
R024,025 *	YFCR32104J	Carbon 100KΩ 1/8W
R026	ERD10TJ562	Carbon 5.6KΩ 1/8W
R027~034 *	YFCR32124J	Carbon 120KΩ 1/8W
R035 *	YFCR32223J or ERJ8GCSJ223	Carbon 22KΩ 1/8W
R036 *	YFCR32223J or ERJ8GCSJ223	Carbon 22KΩ 1/8W
R037	ERD10TJ223	Carbon 22KΩ 1/8W
R038	ERD10TJ562	Carbon 5.6KΩ 1/8W
R039,040 *	YFCR32124J	Carbon 120KΩ
R041	ERJ8GCSJ183	Carbon 18KΩ 1/8W
R042~045	ERD10TJ124	Carbon 120KΩ 1/8W
R050	ERD10TJ120	Carbon 12Ω 1/8W
R052 *	ERJ8GCSJ222	Carbon 2.2KΩ 1/8W
VR001 *	YF0622A2R2KB	Semi Fixed Resistor 2.2KΩ 1/8W
C001	ECEA1HN010S	Electrolytic 1μF 50V
C002 *	YF426473XMS	Ceramic 0.047μF
C003,004	ECEA0JSS470	Electrolytic 47μF 6.3V
C005 *	YFD563WK101J	Ceramic 100pF
C006	ECCF1H471K	Ceramic 470pF
C007,008	ECEA1ESS100	Electrolytic 10μF 25V
C009,010 *	YF426100CHJ	Ceramic 10pF
C011	ECEA0JSS471	Electrolytic 470μF 6.3V
C012 *	YF426221SLK	Ceramic 220pF
C013-016 *	YF426101SLK	Ceramic 100pF
C020	ECQV05104JZ	Plastic 0.1μF 50V
L001	ELET8R2KAM	Coil 8.2μH
X001	EF0A4R0MG01A	Oscillator
CN001-JM	EMCS0450Z	4 pin Jack Male
CN002-JM	EMCS0850Z	8 pin Jack Male
CN003 *	YF742J25410	10p Flat Cable Connector
BI001 *	EMCZ0318D82V	3 pin Connecting Wire Ass'y for BI001 and CN003 (process)
M032	YFV2HA0028D3	Shield Case
M054	YFV2HA0029D3	Shield Cover

YFVPKE0901JA
EVF DISPLAY BOARD

SYM-BOL NO.	PART NO.	DESCRIPTION
PCB005 *	YFVPKE0901JA	Printed Circuit Board Assembly
D001~009	1SS133T	Diode
SW001~	EVQQS405K	Push Switch
009 JA	YFFSN24C10	10p Flat Cable

SYM-BOL NO.	PART NO.	DESCRIPTION
CN001-PF *	YFKRH0004S82	8 pin Connecting Wire Ass'y to VCR Remote

YFVPKF0901JA
VCR REMOTE BOARD

SYM-BOL NO.	PART NO.	DESCRIPTION
PCB006 *	YFVPKF0901JA	Printed Circuit Board Assembly
D001~005	1SS133	Diode
SW001~005	EVQQS405K	Push Switch
SW006 *	YFSSS312L4	Slide Switch
CN001-JM	EMCS0850ZL	8 pin Jack Male from Display

YFVPKG0901JA
AIC CONNECTOR BOARD

SYM-BOL NO.	PART NO.	DESCRIPTION
PCB007 *	YFVPKG0901JA	Printed Circuit Board Assembly
BI001	EMCZ0810D82V	8 pin Connector Wire Ass'y for BI001 and CN002 (Micro Processor)
CN103-PM	YFRP610RD8S	Socket

YFVPKH0801JA
AF CONNECTOR BOARD

SYM-BOL NO.	PART NO.	DESCRIPTION
PCB008 *	YFVPKH0801JA	Printed Circuit Board Assembly
BI001	EMCZ0519D82V	5 pin Connecting Wire Ass'y for BI001 and CN003 (Deflection Board)
CN102-PM	YFRP610RD5S	5 pin Socket

YFVPKJ0901JA
EVF CONNECTOR BOARD

SYM-BOL NO.	PART NO.	DESCRIPTION
PCB009 *	YFVPKJ0901JA	Printed Circuit Board Assembly
Q001	2SB709-QRSTW	Transistor
R001	YFERJ8GCSJ331	Carbon Film Resistor 330Ω 1/8W
R002	YFERJ8GCSJ681	Carbon Film Resistor 680Ω 1/8W
CN101	YFRP610RD8S	EVF Connector
BI001	EMCZ0811D82V	8 pin Connecting Wire Ass'y for BI001 and CN005 (Deflection Board)

YFVPKA0804JA
IRIS/COLOR ADJUST BOARD

SYM-BOL NO.	PART NO.	DESCRIPTION
PCB010 *	YFVPKA0804JA	Printed Circuit Board Assembly
R001	ERD10TJ272	Carbon 2.7KΩ 1/8W
R002	ERD10TJ222	Carbon 2.2KΩ 1/8W
R003,005	ERD10TJ332	Carbon 3.3KΩ 1/8W
R006	ERD10TJ103	Carbon 10KΩ 1/8W
VR001	EVJLCA307B34	Variable Resistor 30KΩ
VR002	EVJLCA307B14	Variable Resistor 10KΩ
SW001	KEG10903	Push Switch

SYMBOL NO.	PART NO.	DESCRIPTION
SW002	YFSSS312L4	Slide Switch
SW003	YWSSF-012M	Slide Switch
SW004	YWSSS322	Slide Switch
BI001 *	EMCZ0713D82V	7 pin Connecting Wire Ass'y for BI and CN005 (process)
BI002 *	EMCZ0410D82V	4 pin Connecting Wire Ass'y for BI and CN001 (Micro processor)

YFVPKB0805JA
STANDBY BOARD

SYMBOL NO.	PART NO.	DESCRIPTION
PCB011 *	YFVPKB0805JA	Printed Circuit Board Assembly
D001	GL9NP2H	LED
R001	ERD10TJ621	Carbon 620Ω 1/8W
R002	ERD10TJ751	Carbon 750Ω 1/8W
R003	ERD10TJ562	Carbon 5.6KΩ 1/8W
SW001	YFSSP643	Slide Switch
CN011-PF	EMCZ0712D82V	7 pin Plug Female to Deflection Board

YFVPKC0805JA
EXT MIC BOARD

SYMBOL NO.	PART NO.	DESCRIPTION
PCB012 *	YFVPKC0805JA	Printed Circuit Board Assembly
CN108	YFHSJ88211	Mic Jack
CN009-PF	EMCZ0316C52	3 pin Plug Female to Deflection Board

YFVPKD0805JA
EARPHONE BOARD

SYMBOL NO.	PART NO.	DESCRIPTION
PCB013 *	YFVPKD0805JA	Printed Circuit Board Assembly
CN107	YFHSJ88211	Earphone Jack
CN007-PF	EMCZ0215B52N	2 pin Plug Female to Deflection Board

YFVPKA0806JA
WHITE SET SWITCH BOARD

SYMBOL NO.	PART NO.	DESCRIPTION
PCB014 *	YFVPKA0806JA	Printed Circuit Board Assembly
SW001,002	YFSSF012F	Slide Switch
CN001-PF	EMCZ0311D62	3 pin Plug Female to Process

YFVAKA0028AN
ADJUSTABLE HANDLE GRIP

SYMBOL NO.	PART NO.	DESCRIPTION
PCB015	YWV3100ZK07	REC Switch Board Assembly
SW003	KEC10902	Start/Stop Push Switch
M071	YWCC702HR02A	VCR Knob
PCB016	YFVPKA0807JA	Zoom Switch Board Assembly
SW001,002	KEG10904	Push Switch
CN001-PF	EMCZ0544D62N	5 pin Plug Female
M061 *	YFV4AA0001AS	Grip Arm
M062 *	YFV4JA0007A4	Coil Spring
M063 *	YFV1HA0003AS	Pin
M064 *	YFV2TA0005B3	Gear Housing
M065 *	YFV4EA0002A3	Gear
M066 *	YFV5JA0002A2	Handle Grip Right Cover
M067 *	YFV4JA0008A4	Spring Washer
M068	YWCC702LR01	Cord Clamp
M069 *	YFV6JA0008A3	Zoom Switch Cover
M070 *	YFV2FA0013B4	Cushion for Switch
M071	YWCC702HR02A	REC Push Button
M072 *	YFV2TA0004A4	Handle Strap Holder
M073 *	YFV5YA0002AS	Band
M074 *	YFV5RA0010A4	Handle Grip Lock Button
M075 *	YFV1FA0002A4	Nut Plate
M076 *	YFV5JA0001A2	Handle Grip Left Cover
M077 *	YFV6EA0001A2	Handle Grip Arm Lid
M078 *	YFV2TA0006A3	Mounting Brocket

YFVPKA0808JA
SHADING CORRECTION BOARD

SYMBOL NO.	PART NO.	DESCRIPTION
PCB018 *	YFVPKA0808JA	Printed Circuit Board
IC001~004	NJM3414M	IC
Q001	2SD636-QRS	Transistor
Q002	2SD661-STU	Transistor
R001	ERD10TJ103	Carbon 10KΩ 1/8W
R002	ERD10TJ394	Carbon 390KΩ 1/8W
R003	ERD10TJ393	Carbon 39KΩ 1/8W
R004	ERD10TJ474	Carbon 470KΩ 1/8W
R005	ERD10TJ103	Carbon 10KΩ 1/8W
R006	ERD10TJ183	Carbon 18KΩ 1/8W
R007	ERD10TJ103	Carbon 10KΩ 1/8W
R008	ERD10TJ183	Carbon 18KΩ 1/8W
R009,010	ERD10TJ332	Carbon 3.3KΩ 1/8W
R011	ERD10TJ102	Carbon 1KΩ 1/8W
R012	ERD10TJ473	Carbon 47KΩ 1/8W
R013	ERD10TJ102	Carbon 1KΩ 1/8W
R014	ERD10TJ103	Carbon 10KΩ 1/8W
R015	ERD10TJ183	Carbon 18KΩ 1/8W
R016	ERD10TJ103	Carbon 10KΩ 1/8W
R017	ERD10TJ183	Carbon 18KΩ 1/8W
R018,019	ERD10TJ332	Carbon 3.3KΩ 1/8W
R020	ERD10TJ102	Carbon 1KΩ 1/8W
R021	ERD10TJ473	Carbon 47KΩ 1/8W
R022	ERD10TJ102	Carbon 1KΩ 1/8W
R023	ERD10TJ332	Carbon 3.3KΩ 1/8W

SYMBOL NO.	PART NO.	DESCRIPTION
R024	ERD10TJ133	Carbon 13KΩ 1/8W
R025	ERD10TJ223	Carbon 22KΩ 1/8W
R026	ERD10TJ203	Carbon 20KΩ 1/8W
R027	ERD10TJ153	Carbon 15KΩ 1/8W
R028	ERD10TJ474	Carbon 470KΩ 1/8W
R029	ERD10TJ183	Carbon 18KΩ 1/8W
R030,031	ERD10TJ103	Carbon 10KΩ 1/8W
R032	ERD10TJ183	Carbon 18KΩ 1/8W
R033	ERD10TJ102	Carbon 1KΩ 1/8W
R034,035	ERD10TJ332	Carbon 3.3KΩ 1/8W
R036	ERD10TJ102	Carbon 1KΩ 1/8W
R037	ERD10TJ473	Carbon 47KΩ 1/8W
R038	ERD10TJ183	Carbon 18KΩ 1/8W
R039	ERD10TJ103	Carbon 10KΩ 1/8W
R040	ERD10TJ102	Carbon 1KΩ 1/8W
R041,042	ERD10TJ332	Carbon 3.3KΩ 1/8W
R043	ERD10TJ102	Carbon 1KΩ 1/8W
R044	ERD10TJ473	Carbon 47KΩ 1/8W
R045	ERD10TJ102	Carbon 1KΩ 1/8W
R046	ERD10TJ562	Carbon 5.6KΩ 1/8W
VR001~014	YWH0651A22K	Variable Resistor 22KΩ
C001	ECQV05823JZ	Plastic 0.082μF 50V
C002	ELEA1HSS010	Electrolytic 1μF 50V
C003	ECQV05823JZ	Plastic 0.082μF 50V
C004	ECEA/ASS470	Electrolytic 47μF 10V
C005	ECQV05103JZ	Plastic 0.01μF 50V
C006	ECQV05473JZ	Plastic 0.047μF 50V
C007	ECKF1H681KB	Ceramic 680pF 50V
C008	ECE1CSS100	Electrolytic 10μF 16V
CN001-JM	EMCS0952M	9 pin Jack Male to Micro Processor

YFVAKA0072AN

EVF MISCELLANEOUS

SYMBOL NO.	PART NO.	DESCRIPTION
CRT002 ⚠	40JB4	Cathode Ray Tube
L003 ⚠	ELY15V113C	Deflection Coil
CN003	YFVFSOCKET	CRT Socket
CN101 *	YF10F8PB145C	EVF Connector Cable Ass'y
CN001-PF *	YF10F8PB145C	8 pin Connecting Wire Ass'y for CN001 and CN102
M080 *	YFV5EB0030A2	EVF Upper Cover
M081 *	YFV5EB0031B2	EVF BottomCover
M082	YWCC704FM02	Fixing Screw for Shoe
M083	YWCC704WM07	Leaf Spring for Shoe
M084 *	YFV5MA0002A4	Accessory Shoe
M085 *	YFV2CA0011A4	Mounting Nut Plate A
M086 *	YFV4JA0009A4	Leaf Spring for CRT
M087 *	YFV2CA0010A4	Lock Spring Holder
M088 *	YFV4JA0006A4	Lock Spring
M089 *	YFV1HA0002A4	Lock Pin
M090 *	YFV5RA0009A4	Lock Knob
M091 *	YFV2SA0020A4	Mounting Nut Plate B
M092 *	YFV2SA0018A4	Reinforce Plate
M093 ⚠ *	YFV7MA0026A4	High Voltage Caution Label
M094 *	YFV2SB0025A4	Caution Label

SYMBOL NO.	PART NO.	DESCRIPTION
M095 *	YFV5EB0032A2	CRT Upper Case
M096 *	YFV5EB0033A2	CRT Bottom Case
M097 *	YFV5GA0004A4	Eye Cap
M098 *	YFV3CA0007A4	Lens Holder
M099 *	YFV1VA0002A4	EVF Lens
M100 *	YFV3CB0006A3	Eye Cap Holder
M101 *	YFV4JA0010A4	Eye Cap Spring
M102 *	YFV2VA0005A4	Ground Plate
M103 *	YFV1UA0002A4	EVF Mirror
M104 *	YFV4JA0005A4	Mirror Support Spring
M105 *	YFV2FA0007A4	Face Rubber
M106 *	YFV2FA0014A4	CRT Rubber Cushion
M107 *	YFV3FA0003A4	Support Ring for CRT Case

YFVPKA0803JA
EVF BOARD

SYMBOL NO.	PART NO.	DESCRIPTION
PCB017 *	YFVPKA0803JA	Printed Circuit Board Assembly
Q001 ⚠	2SD975	Transistor
Q002	2SB642-QRS	Transistor
Q003	2SA564-QRS	Transistor
D001	MA165	Diode
D002	MA162	Diode
D003	ES01F	Diode
R001	ERD10TJ222	Carbon 2.2KΩ 1/4W
R002	ERD25FJ565	Carbon 5.6MΩ 1/4W
R003	ERD25FJ275	Carbon 2.7MΩ 1/4W
R004	ERD10TJ222	Carbon 2.2KΩ 1/8W
R005	ERD10TJ101	Carbon 100Ω 1/8W
R006	ERD10TJ105	Carbon 1MΩ 1/8W
R007	ERD10TJ223	Carbon 22KΩ 1/8W
R008	ERD10TJ362	Carbon 3.6KΩ 1/8W
R009	ERD10TJ562	Carbon 5.6KΩ 1/8W
R010	ERD10TJ223	Carbon 22KΩ 1/8W
R011	ERD10TJ472	Carbon 4.7KΩ 1/8W
VR001	EVM45GA00BV6	Semi Fixed Resistor 5.6MΩ
VR002	EVN8ACA00BQ3	Variable Resistor 4.7KΩ
VR003	EVN8ACA00BQ5	Variable Resistor 470KΩ
C001	ECEA1ASS470	Electrolytic 47μF 10V
C002	ECEA10Z100	Electrolytic 100μF 10V
C003 ⚠	ECEA1ASS221	Electrolytic 220μF 10V
C004 ⚠	ECQP1302JZ	Plastic 3000pF 100V
C005~007 *	YFDE979B152K	Ceramic 1500pF
C008	ECEA1HSS100	Electrolytic 10μF 50V
C009	ECCR1H181JC	Ceramic 180pF 50V
C010	ECEA1ASS470	Electrolytic 47μF 10V
C011	ECQV05823JZ	Plastic 0.082μF 50V
C012	ECEA1CSS100	Electrolytic 10μF 16V
VL001 *	YFVFSIZECOIL	Coil
L001	YFVC101J	Coil 10μH
L002	ELH-5L62	Coil 220μH
T001 ⚠ *	YFHIPAKEVF90	Flyback Transformer
CN001-JM	EMCS0850Z	8 pin Jack Male
CN002-JM	EMCS0450Z	4 pin Jack Male
BI001 *	YFVFSOCKET	6 pin connecting wire ass'y for BI001

WM-4026L

MICROPHONE ASSEMBLY

SYMBOL NO.	PART NO.	DESCRIPTION
M111 *	YFV5EB0034A3	Mic Cover for Right Side
M112 *	YFV5EB0035A3	Mic Cover for Left Side
M113	YWCC706WB02	Mic Cushion B
M114	YWCC706WB01	Mic Cushion A
M115 *	YPM-MP079AA	Mic Bar Ass'y
M116 *	YFWM-043	Mic Unit
M117 *	YPM-SM307AA	Mic Unit Cover
M118	YPM-MQ434BA	Wind Screen
M119 *	YFV2SA0021A4	Mic Mounting Bracket

YFUAF4

AUTO FOCUS LENS UNIT

SYMBOL NO.	PART NO.	DESCRIPTION
S001 *	YFES905-06	Focus Ring Position Sensor
CN103-PM*	YFRP610PF-8S	8 pin Connector Wire Ass'y
MIC001 *	YFSS520-02	Transducer
M130 *	YFAFV-3	AFC Lens
M131 *	YFES002-74	AFC Left Side Cover
M132 *	YFES901-16	AFC Right Side Cover Ass'y
M133 *	YFES002-76	AFC Front Cover
M134 *	YFES017-06	Horn
M135 *	YFES014-39	Slide Switch Cover
M136 *	YFES014-3	Push Switch Knob
M137 *	YFES110-11	AF Lens Chassis
M138 *	YFES113-03	Senser Shield Case
M140 *	YFES519-02	Motor Ass'y
M141 *	YFES905-05	Gear Ass'y
M142 *	YF146726	Lens Cap
M143 *	YF146720	Lens Hood
M144 *	YW328231	Zoom Lever

YFES950-24A
AUTO FOCUS BOARD-A

SYMBOL NO.	PART NO.	DESCRIPTION		
PCB021 *	YFES950-24A	Printed Circuit Board Assembly		
IC001	YFSS514-49	Integrated Circuit		
IC002	TA7120P	Integrated Circuit		
IC003	AN6914	Integrated Circuit		
IC004	NJM78L05A	Integrated Circuit		
IC005	UPD4069UBC	Integrated Circuit		
IC006	UPD4011BC	Integrated Circuit		
IC007	NJM78L05A	Integrated Circuit		
Q001	2SC2603 or 2SC2458	Transistor		
Q002	2SA1115 or 2SA1048	Transistor		
Q003	2SD966	Transistor		
Q004	2SC1317	Transistor		
Q005	2SD966	Transistor		
Q006~009	2SC2603 or 2SC2458	Transistor		
Q010,011	2SC2603 or 2SC2458	Transistor		
D001	YWRA-1Z	Diode		
D002	MA1047	Diode		
D003	MA1091	Diode		
D004~007	YWRA-1Z	Diode		
D008	MA1047	Diode		
D009,010	MA150	Diode		
X001	YFSS14-48	Crystal		
TH001	YFSC010-09	Thermister		
TH002	YFSC300-43	Thermister		
R001	ERD10TJ273	Carbon	27KΩ	1/8W
R002	ERQ14AJ270	Carbon	27Ω	1/4W
R003	ERD10TJ273	Carbon	27KΩ	1/8W
R004	ERD10TJ152	Carbon	1.5KΩ	1/8W
R005	ERC14GK1R8	Solid	1.8Ω	1/4W
R006	ERD10TJ102	Carbon	1KΩ	1/8W
R007	ERD10TJ470	Carbon	47Ω	1/8W
R008	ERD10TJ121	Carbon	120Ω	1/8W
R009	ERD10TJ272	Carbon	2.7KΩ	1/8W
R010	ERD10TJ472	Carbon	4.7KΩ	1/8W
R011	ERD10TJ563	Carbon	56KΩ	1/8W
R012	ERD10TJ183	Carbon	18KΩ	1/8W
R013	ERD10TJ224	Carbon	220KΩ	1/8W
R014	ERD10TJ683	Carbon	68KΩ	1/8W
R015	ERD10TJ152	Carbon	1.5KΩ	1/8W
R016	ERD10TJ473	Carbon	47KΩ	1/8W
R017	ERD10TJ123	Carbon	12KΩ	1/8W
R018	ERD10TJ273	Carbon	27KΩ	1/8W
R020	ERD25VJ185	Carbon	1.8MΩ	1/4W
R021	ERD10TJ102	Carbon	1KΩ	1/8W
R023	ERD10TJ153	Carbon	15KΩ	1/8W
R024	ERD10TJ104	Carbon	100KΩ	1/8W
R026~031	ERD10TJ104	Carbon	100KΩ	1/8W
R032,033	ERD10TJ563	Carbon	56KΩ	1/8W
R034	ERD10TJ564	Carbon	560KΩ	1/8W
R035	ERD10TJ104	Carbon	100KΩ	1/8W
R039	ERD10TJ223	Carbon	22KΩ	1/8W
R042,43	ERD10TJ223	Carbon	22KΩ	1/8W
R044	ERD10TJ333	Carbon	33KΩ	1/8W
R045,046	ERD10TJ223	Carbon	22KΩ	1/8W
R047	ERD10TJ102	Carbon	1KΩ	1/8W
R048	ERD10TJ564	Carbon	560KΩ	1/8W
R049	ERD10TJ102	Carbon	1KΩ	1/8W
R050	ERD10TJ104	Carbon	100KΩ	1/8W
R051	ERD10TJ102	Carbon	1KΩ	1/8W
R052	ERD10TJ103	Carbon	10KΩ	1/8W
VR001	EVNB1AA00B34	Variable Resistor	30KΩ	
VR002	EVNA6AA00B34	Variable Resistor	30KΩ	
VR003	EVNA1AA00B14	Variable Resistor	10KΩ	
C001	ECEA1CS100	Electrolytic	10μF	16V
C002	ECEA1ASS102	Electrolytic	1000μF	10V
C003	ECQM4332K	Plastic	3300pF	400V
C004	ECCF1H102K	Ceramic	1000pF	50V
C005	ECEA1CS100	Electrolytic	10μF	16V
C006	ECEA1HSSR22	Electrolytic	0.22μF	50V
C007,008	ECKF1H103KB	Ceramic	0.01μF	50V

SYMBOL NO.	PART NO.	DESCRIPTION
C009	ECCF1H102K	Ceramic 1000pF 50V
C010	ECSF35ER68	Electrolytic 0.68μF 35V
C011	ECEA1CS100	Electrolytic 10μF 16V
C012	ECQS1271JZ	Polyester 270pF 50V
C013~018	ECFDE203ZB	Ceramic 0.02μF 50V
C019	ECCF1H121J	Ceramic 120pF 50V
C020	ECCF1H471J	Ceramic 470pF 50V
C021	ECEA1CS100	Electrolytic 10μF 50V
C025,026	ECEA1HS010	Electrolytic 1μF 50V
C027	ECEB1HS010	Electrolytic 1μF 50V
C034	ECEA1ES220	Electrolytic 22μF 25V
L001	YFSS506-96	Band Pass Filter
T001	YFSS506-97	Transformer
SW001	YFSC300-43	Slide Switch
CN001-JM	YFSS111-75	7-pin Jack Male
CN102-PM	RP610P5PA10	5-pin Connecting Wire Ass'y
M186	YFES113-04	Shield Case (A)
M187	YFES113-05	Shield Case (B)

YFES950-24B
AUTO FOCUS BOARD-B

PCB022 *	YFES950-24B	Printed Circuit Board Assembly
IC008	AN6914	Integrated Circuit
Q012	2SA720-QR	Transistor
Q013	2SD965-QR	Transistor
Q014	2SC1317-QR	Transistor
Q015	2SA720-QR	Transistor
Q016	2SD965-QR	Transistor
R053	ERD10TJ184	Carbon 180KΩ 1/8W
R054	ERD10TJ274	Carbon 270KΩ 1/8W
R055	ERD10TJ332	Carbon 3.3KΩ 1/8W
R056	ERD10TJ152	Carbon 1.5KΩ 1/8W
R057	ERD10TJ682	Carbon 6.8KΩ 1/8W
R058	ERD10TJ392	Carbon 3.9KΩ 1/8W
R059	ERD10TJ472	Carbon 4.7KΩ 1/8W
R060, 061	ERD10TJ222	Carbon 2.2KΩ 1/8W
R062,063	ERD10TJ102	Carbon 1KΩ 1/8W
R064	ERD10TJ472	Carbon 4.7KΩ 1/8W
R065	ERD10TJ222	Carbon 2.2KΩ 1/8W
CN002-PM	YFB2B-XH	2-pin Connector with Cable

YFES950-24C
AUTO FOCUS BOARD-C

PCB023 *	YFES950-24C	Printed Circuit Board Assembly
SW002	EVQQJ104K	Push Switch

YFES950-24D
AUTO FOCUS BOARD-D

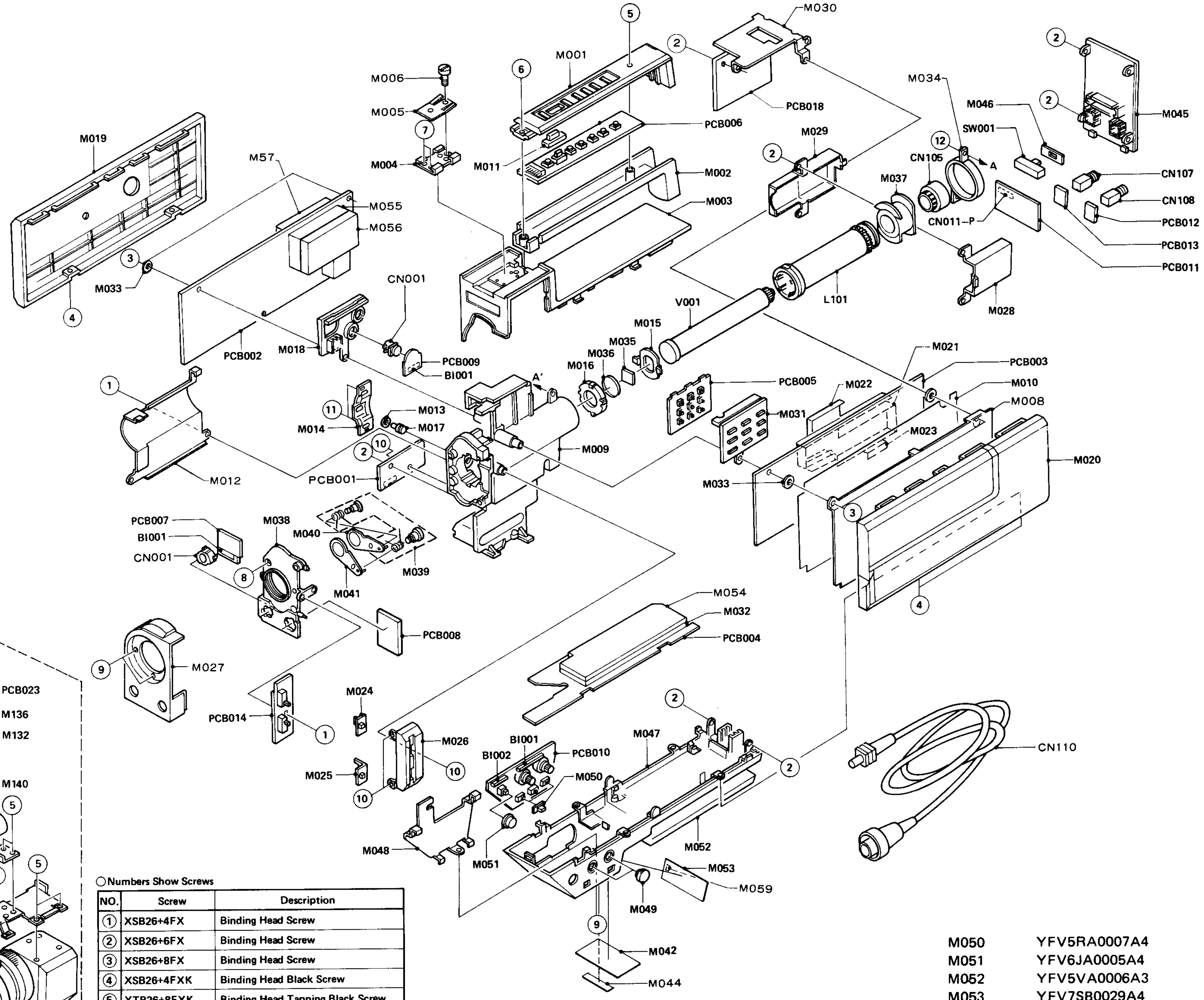
SYMBOL NO.	PART NO.	DESCRIPTION
PCB024 *	YFES950-24D	Printed Circuit Board Assembly
Q017	2SC2458	Transistor
Q018	2SA1048	Transistor
Q019	2SC2458	Transistor
Q020	2SB873	Transistor
R005	ERD10TJ1R8	Carbon 1.8Ω 1/8W
R068	ERD10TJ103	Carbon 10KΩ 1/8W
R069	ERD10TJ222	Carbon 2.2KΩ 1/8W
R070	ERD10TJ223	Carbon 22KΩ 1/8W
R071	ERD10TJ562	Carbon 5.6KΩ 1/8W
R072	ERD10TJ222	Carbon 2.2KΩ 1/8W
R073	ERD10TJ562	Carbon 5.6KΩ 1/8W
R074	ERD10TJ103	Carbon 10KΩ 1/8W
R075	ERD10TJ471	Carbon 470Ω 1/8W
C029	ECEA1CS470	Electrolytic 47μF 16V
C030	ECKF1H103KB	Ceramic 0.01μF 50V
C039	ECCF1H392K	Ceramic 0.039μF 50V

ACCESSORY PARTS/PACKAGING PARTS

M150 *	YFV8QA0118AN	Operating Instructions
M151	YFPTM81C21	Warranty Card
M152	YZB20X35A02	Polyethylene Bag for Cable and E.V.F
M153	XZB26X40C05	Polyethylene Bag for Operating Instruction
M154	XZB38X70A02	Polyethylene Bag for Camera
M155 *	YFV9CA0136AN	Packaging Case

EXPLODED VIEW OF CAMERA

PCB021	YFES950-24A
PCB022	YFES950-24B
PCB023	YFES950-24C
PCB024	YFES950-24D
CN002-PF	EMCL047B82V
CN102-PM	RP610P5PA10
CN103-PM	YFRP610PF-8S
MIC001	YFSS520-02
S001	YFES905-06
M130	YFAFV-3
M131	YFES002-74
M132	YFES901-16
M133	YFES002-76
M134	YFES017-06
M135	YFES014-39
M136	YFES014-3
M137	YFES110-11
M138	YFES113-03
M140	YFES519-02
M141	YFES905-05
M142	YF146726
M143	YF146720
M144	YW328231
M186	YFES113-04
M187	YFES113-05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PCB008
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PCB014
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M025
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BI001
BI002
PCB010
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M059
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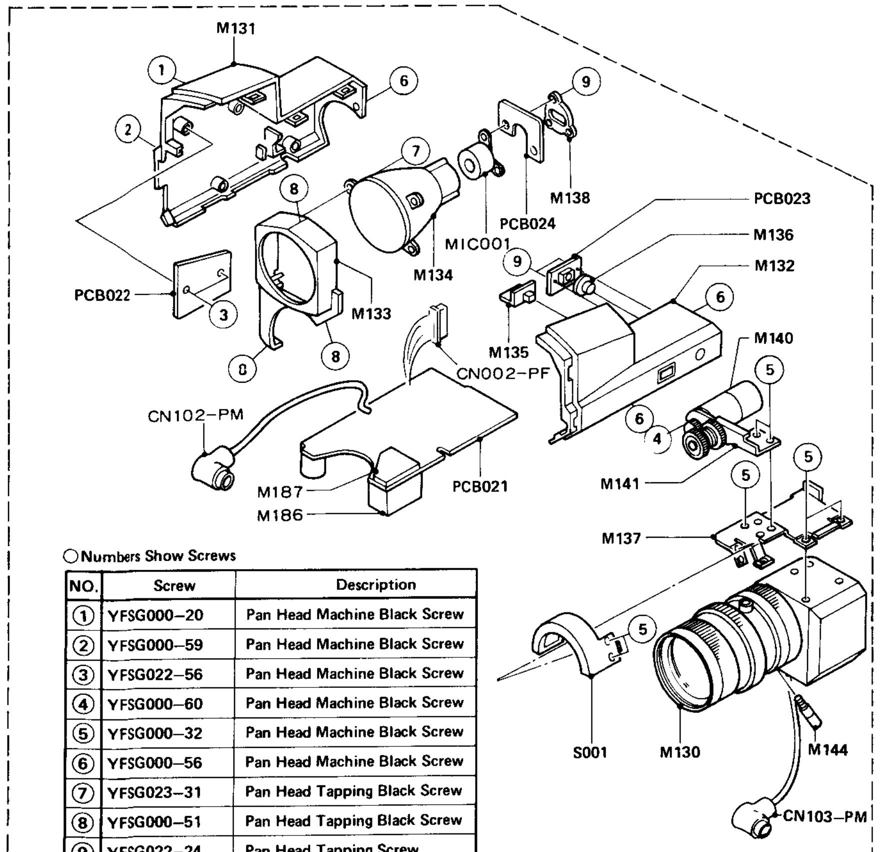
M044

AUTO FOCUS LENS UNIT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M135
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M140
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CN102-PM
6
4
M187
M186
PCB021
M141
5
5
M137
5
S001
M130
M144
CN103-PM

○Numbers Show Screws

NO.	Screw	Description
①	YFSG000–20	Pan Head Machine Black Screw
②	YFSG000–59	Pan Head Machine Black Screw
③	YFSG022–56	Pan Head Machine Black Screw
④	YFSG000–60	Pan Head Machine Black Screw
⑤	YFSG000–32	Pan Head Machine Black Screw
⑥	YFSG000–56	Pan Head Machine Black Screw
⑦	YFSG023–31	Pan Head Tapping Black Screw
⑧	YFSG000–51	Pan Head Tapping Black Screw
⑨	YFSG022–24	Pan Head Tapping Screw

○Numbers Show Screws

NO.	Screw	Description
①	XSB26+4FX	Binding Head Screw
②	XSB26+6FX	Binding Head Screw
③	XSB26+8FX	Binding Head Screw
④	XSB26+4FXK	Binding Head Black Screw
⑤	XTB26+8FXK	Binding Head Tapping Black Screw
⑥	XSB26+16FXK	Binding Head Black Screw
⑦	XSS2+6FX	Flush Head Machine Screw
⑧	XSS26+4FX	Flush Head Machine Screw
⑨	XSS26+4FXK	Flush Head Machine Black Screw
⑩	XYN26+F6FX	Machine Screw and Washer Assembly
⑪	XYN26+F8FX	Machine Screw and Washer Assembly
⑫	XYN26+C6FX	Machine Screw and Washer Assembly

M050	YFV5RA0007A4
M051	YFV6JA0005A4
M052	YFV5VA0006A3
M053	YFV7SB0029A4
M055	YFV2HA0026B4
M056	YFV2HA0030A4
M057	YFV2HA0027A4
M059	YFV7SA0027A4

PCB001	YFVPKA0802JA
PCB002	YFVPKB4850JA
PCB003	YFVPKC4850JA
PCB004	YFVPKD0801JA
PCB005	YFVPKE0901JA
PCB006	YFVPKF0901JA
PCB007	YFVPKG0901JA
PCB008	YFVPKH0801JA
PCB009	YFVPKJ0901JA
PCB010	YFVPKA0804JA
PCB011	YFVPKB0805JA
PCB012	YFVPKC0805JA
PCB013	YFVPKD0805JA
PCB014	YFVPKA0806JA
PCB018	YFVPKA0808JA
V001	S4131A
L001	ELY18A205H
SW001	YFSSP643
CN105	YFSB46001
CN107,108	YFHSJ88211
CN110	EMCU10B5T10A
M001	YFV9AA0058AN
M002	YFV6AB0001A3
M003	YFV9AA0056AS
M004	YFV5MA0001A4
M005	YFV4JA0004B4
M006	YWFAC17XFM2
M008	YFV2HA0023C3
M009	YFV2KA0029B2
M010	YFV2PA0011B3
M011	YFV5RA0008A4
M012	YFV2HA0020C3
M013	YFV2PA0021A4
M014	YFV3CA0003A4
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M017	YFV4DA0002A4
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M020	YFV9AA0057AS
M021	YFV2HA0025E4
M022	YFV2HA0031B4
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M024	YFV5RA0005A4
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M026	YFV5EB0018A3
M027	YFV5ED0026AS
M028	YFV2HA0021A4
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M030	YFV2SA0015C4
M031	YFV9AA0059AS
M032	YFV2HA0028D3
M033	YWCC500LB13
M034	YWCC701FR01A
M035	YWXTALLPF23L
M036	YWIR1R6X16R5
M037	YFB1ANLITE90
M038	YFV2TA0007BS
M039	YFV1EA0003AS
M040	YFCCFILTER
M041	YFWBFILTER
M042	YFV7QL0079A4
M044	YVZC700RB50
M045	YFV5EB0019AS
M046	YFV5WA0042A4
M047	YFV5EB0021BS
M048	YFV2SA0017A4
M049	YFV5RA0003A4

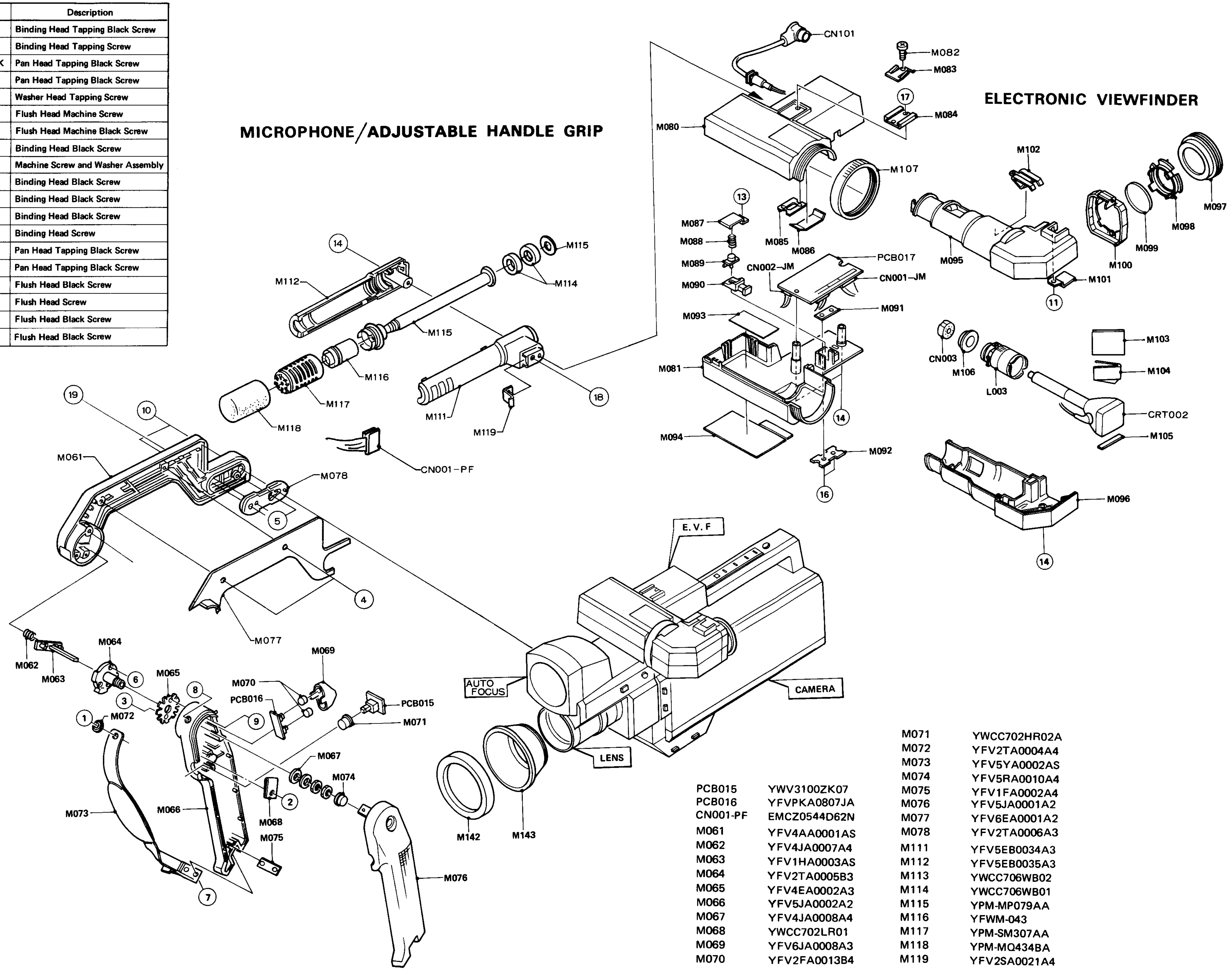
EXPLODED VIEW

○Numbers Show Screws

NO.	Screw	Description
①	XTB3+6BFXK	Binding Head Tapping Black Screw
②	XTB26+5BFX	Binding Head Tapping Screw
③	XTN26+15BEXK	Pan Head Tapping Black Screw
④	XTN26+8BFXE	Pan Head Tapping Black Screw
⑤	XTW3+8EFX	Washer Head Tapping Screw
⑥	XSS3+8FX	Flush Head Machine Screw
⑦	XSS26+6FXK	Flush Head Machine Black Screw
⑧	XSB26+10FXK	Binding Head Black Screw
⑨	XYN3+AC8FX	Machine Screw and Washer Assembly
⑩	XSB4+20FXK	Binding Head Black Screw
⑪	XSB3+4FXK	Binding Head Black Screw
⑫	XSB2+8FXK	Binding Head Black Screw
⑬	XTB3+8BFX	Binding Head Screw
⑭	XTN3+30BFXK	Pan Head Tapping Black Screw
⑮	XTN2+10BFXK	Pan Head Tapping Black Screw
⑯	XSS3+8FXK	Flush Head Black Screw
⑰	XSS2+6FX	Flush Head Screw
⑱	XSS2+6FXK	Flush Head Black Screw
⑲	XSS26+8FX	Flush Head Black Screw

MICROPHONE/ADJUSTABLE HANDLE GRIP

ELECTRONIC VIEWFINDER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M085
M086
PCB017
CN002-JM
CN001-JM
M095
M101
⑪
M091
M093
M081
CN003
M106
L003
M103
M104
CRT002
M105
⑭
M094
M092
⑯
M096
⑭
⑭
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M115
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M116
M117
M118
M111
M119
⑱
⑲
⑩
M061
M078
⑤
CN001-PF
④
M077
E.V.F
AUTO FOCUS
CAMERA
LENS
M062
M063
M064
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M065
③
①
M072
⑧
⑨
M070
PCB016
M069
PCB015
M071
M067
M074
M073
M066
M068
②
M075
⑦
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M142
M143

PCB017	YFVPKA0803JA
CRT002	40JB4
L003	ELY15V113C
CN003	YFVFSOCKET
CN001-JM	EMCS0850Z
CN002-JM	EMCS0450Z
CN101	YF10F8PB145C
M080	YFV5EB0030A2
M081	YFV5EB0031B2
M082	YWCC704FM02
M083	YWCC704WM07
M084	YFV5MA0002A4
M085	YFV2CA0011A4
M086	YFV4JA0009A4
M087	YFV2CA0010A4
M088	YFV4JA0006A4
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M098	YFV3CA0007A4
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M101	YFV4JA0010A4
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M105	YFV2FA0007A4
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M107	YFV3FA0003A4

PCB015	YWV3100ZK07
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M063	YFV1HA0003AS
M064	YFV2TA0005B3
M065	YFV4EA0002A3
M066	YFV5JA0002A2
M067	YFV4JA0008A4
M068	YWCC702LR01
M069	YFV6JA0008A3
M070	YFV2FA0013B4

M071	YWCC702HR02A
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M073	YFV5YA0002AS
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M076	YFV5JA0001A2
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M113	YWCC706WB02
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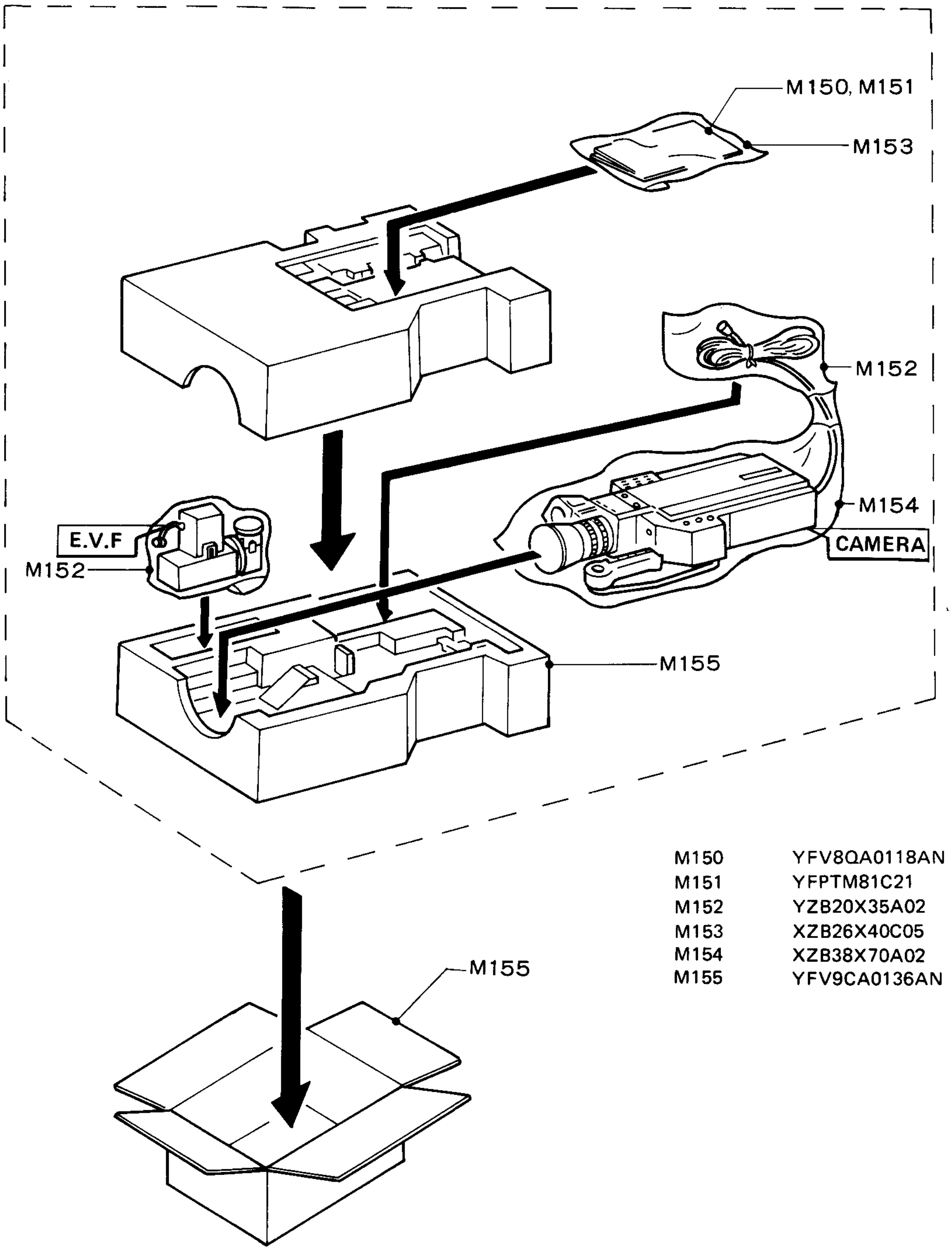
PACKAGING VIEW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M153	XZB26X40C05
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M155	YFV9CA0136AN